UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

JUAN DUARTE, BETSY DUARTE
and N.D., Infant, by Parents
and Natural Guardians JUAN
DUARTE and BETSY NOBLES, On
Behalf of Themselves and
All Others Similarly Situated,

Plaintiffs,

vs. No. 2:17-cv-01624-ES-SCM

UNITED STATES METALS
REFINING COMPANY; FREEPORT
MINERALS CORPORATION and
AMAX REALTY DEVELOPMENT, INC.,

Defendants.

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VIDEOTAPED DEPOSITION OF GEORGE FLOWERS, Ph.D.,
taken at 4 Gateway Center,
Newark, New Jersey, at 8:52 a.m.,
Friday, June 14, 2019, before Robin
LaFemina, a Registered Professional
Reporter, Certified LiveNote Reporter and
Notary Public.

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I N D E X

I N D E X (C'td.)

Correlation

I N D E X (C'td.)

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I N D E X (C'td.)

THE VIDEOGRAPHER: Good morning. This is the video operator speaking, Eric Lenz, of Worldwide Court Reporters. Today is Friday, June 14, 2019. The time is approximately 8:52 in the morning. We are at the offices of McCarter English, 4 Gateway Center, Newark, New Jersey, for the video deposition of Dr. George Flowers in the matter of Duarte, et al. versus U.S. Metals Refining Company, et al. This is in the U.S. District Court, District of New Jersey, matter number 2:17-CV-01624.

Counsel, please introduce yourselves.

MR. SUTHERLAND: Lewis Sutherland for defendants.

MR. GERMAN: Steven German for the plaintiffs.

MR. GADOURY: Chris Gadoury for the plaintiffs.

THE VIDEOGRAPHER: And will our court reporter, Robin LaFemina --

MR. SUTHERLAND: Hold on. Do we

want to get who's on the phone?

THE VIDEOGRAPHER: I beg your pardon.

MR. NIDEL: Chris Nidel by telephone for the plaintiffs.

MR. RUBENSTEIN: Joel Rubenstein by telephone.

MR. GERMAN: For the plaintiffs.

THE VIDEOGRAPHER: Okay.

And will our court reporter, Robin LaFemina, please swear the witness.

GEORGE FLOWERS, Ph.D.,

called as a Witness, having been first duly sworn by Robin LaFemina, a Notary Public within and for the State of New York, was examined and testified as follows:

EXAMINATION BY

MR. SUTHERLAND:

Q. Dr. Flowers, you've had your deposition taken a number of times before; correct?

A. Yes.

Q. And so I'm not going to go over

all the rules and everything, but you understand that the testimony you give today is under oath; correct?

A. Yes.

Q. And you understand that I am -- my name is Lewis Sutherland and I represent the defendants in the litigation where you are providing expert testimony for the plaintiffs; correct?

A. Yes.

Q. And if at any point in time today you don't understand a question that I'm asking you, I would ask that you tell me that so I can clarify the question.

Is that okay with you?

A. Yes.

Q. And if you answer the question that I've asked, I'm going to assume that you've understood the question, at least to the best of your ability; correct?

MR. GERMAN: Objection.

A. Yes.

Q. And, again, if at any point in time you need to take a break, that's fine with me, just let me know, I may finish up

the question that I'm working on, but this is not an endurance contest and we can take a break whenever you need to.

Okay?

A. Yes.

Q. I hand you a document that I've marked as Exhibit 542.

(Exhibit 542, Notice of Deposition of George Flowers, marked for identification, as of this date.)

Q. Do you recognize that document?

A. Yes, I do.

Q. And have you seen it before?

A. Yes, I have.

Q. And if I just direct your attention to the last page of Exhibit 542, there's a request for documents.

Do you see that?

A. Yes.

Q. And the counsel for the plaintiffs provided me with a link yesterday afternoon that included a number of files, your GIS files, your data files, your reference files and some deposition transcripts.

Are those documents that you prepared in response to this request for documents?

A. Yes.

Q. And those links and the documents contained within those links, is that -- do those represent a complete set of documents that you relied on in connection with the preparation of your report in this case?

A. Yes.

Q. Is there anything else other than those documents that you relied on that you can think of as you sit here right now?

A. No.

Q. And if at any point in time during the deposition you remember that there was something else that you're relying on, then you'll tell me that; right?

A. Yes.

Q. What did you do to get ready for your deposition today?

A. I read my report, I read deposition transcripts for Dr. Blum, Dr. Singh, Dr. Rosenfeld and Dr. Sullivan,

and that's about it.

Q. How much time did you spend reading those deposition transcripts approximately?

A. Probably 20 hours. I didn't keep track exactly.

Q. Was there anything in those deposition transcripts, the testimony by those witnesses, that, as you sit here right now, that you can remember that you disagreed with?

A. I -- no. I think -- there's so much information in the transcripts, a specific question would be helpful.

Q. Okay.

But as you sit here, there's nothing that jumps out at you right now that says, oh, my goodness, I don't agree with that?

A. I have some different opinions about certain aspects in them, but they're so specific that, you know, I would like a question about them.

Q. Okay.

A. You know. So when we -- as we

get into discussing things, those depositions may come up.

Q. Okay.

Let me go -- and --

A. The one exception I would make is I did note in Sullivan's deposition that he mentioned an input error to his air model. That's not a disagreement in his conclusion -- with his conclusions as much as it's just a fact that's in the deposition.

Q. And that error that Mr. Sullivan made in his air model resulted in an overall estimation of the historic emissions from the USMR facility; correct?

A. I don't know. I would reserve judgment until I see the revised air model.

Q. Okay.

And to the extent that your report relies on the work by Sullivan, are you reserving judgment in terms of how his revised model may impact your --

MR. GERMAN: Objection.

Q. -- own conclusions here?

MR. GERMAN: Objection. Form and foundation. You may answer.

THE WITNESS: Okay.

A. I'm not relying on his quantitative results. I'm looking at the configuration of the plume, the fact that the plume, according to the model, went out over the class area. So I'll wait until he revised the model and then reevaluate it.

Q. So if I understand your testimony correctly, you are not relying on the air modeling predictions as far as the quantity of metals that were deposited on the soil; is that right?

A. Right. I see the model as qualitative.

Q. And the qualitative information that you're taking from it is essentially the geographic shape of the plume; correct?

A. Yes. Where the lobes of deposition are.

Q. You issued an original report in this case on May 6 of 2019; correct?

A. Yes.

Q. And then you issued a revised report on June 10 of 2019; is that right?

A. Yes.

Q. You have a copy of the June 10 version in front of you; is that right?

A. Yes.

Q. And I'm happy to mark your copy, I have a copy for you. Do you have a preference on whether or not you want to keep yours?

A. I'd rather keep mine --

Q. Okay.

A. -- clean.

Q. All right.

Well, let me go ahead and mark Exhibit 543.

(Exhibit 543, revised expert report of George C. Flowers, Ph.D., P.G., marked for identification, as of this date.)

MR. GERMAN: That's clean; right?

THE WITNESS: Yes.

Q. And I'll hand this to you.

A. Okay.

Q. And if you could identify Exhibit 543 for the record, please.

A. Exhibit 543 marked 6/14/15

[sic], title is USMR Smelter Impact on Carteret, New Jersey Residential Soils, Revised Report Submitted to German & Rubenstein, LLP June 10, 2019 by George C. Flowers.

Q. And does Exhibit 543 contain the opinions that you expect to render in this case, at least so far as class certification goes?

A. Yes. Subject to revision as other information becomes available, for example, the revision of the air model.

Q. Okay.

But as of today, it's a complete expression of your opinions?

A. Yes.

Q. Okay.

What are the differences between Exhibit 543 and the original version that you produced on May 6?

A. The main difference is inclusion of the final tranche of sample data for the plaintiffs. There were three tranches, one sort of December/January, one March/April and then there was one extending into May,

and I didn't have time to include those in the May 6 report. So I included them in this revision. So that's the major change.

Q. Did the May 6 sampling data change any of your opinions?

A. No.

Q. It was just more data that you wanted to include?

A. Right.

Q. And if you could turn to page 4 of Exhibit 543 --

A. There were some other changes.

Q. Okay. Well --

A. You know.

Q. -- let's go ahead and finish that. What other changes?

A. Because they're just -- they're not substantive and they didn't change any of my opinions.

If you go to -- let's see if I can find it -- if you go to point 1 on page 1 --

Q. Mm-hmm.

A. -- at the very end, the last sentence, heavy metal contamination from the

USMR's smelter has frequently increased soil loading in the proposed class area that exceed ambient background contamination for all contaminants, that sentence was modified, and it will persist. So I think it's just the clause that exceed ambient background concentrations for all contaminants.

Q. And why did you change that?

A. It was an oversight not including it.

Q. Any other changes?

A. Okay. Let's just go -- hopefully I can remember them all. I corrected, if you can find this hard to believe for a geochemist, I corrected the reactions on page 6, somehow I had some typos in them, so they're balanced now.

Q. Okay.

A. They're just generalized reactions showing smelter processes in a copper smelter. Let's see. If you look at Table 4 on page 16, I had a typo, again, inconsequential, as a percentage in the standard deviations for copper and lead.

Q. Okay.

A. You know, it's in the last two decimal points in a number 4,000 or 3,000.

Q. All right.

Anything else?

A. I think that's it. To the best of my knowledge at this point.

Q. I noticed one other thing on page 21 at the bottom, there's a calculation of --

A. Oh, that's right. You're right.

Q. -- of the --

A. There is one more.

Q. -- impact from I guess it's the McVehil modeling?

A. Yes. That was an error in the first report. I left out a conversion factor.

Q. Okay.

So that was just a math error that you --

A. It's a math -- well, it's like I forgot to convert from pounds to grams.

Q. Okay.

A. But I fixed it.

Q. Okay.

A. I think that's pretty much it.

Q. Okay. All right.

If you could turn to page 4 of Exhibit 543 and if you look at the first paragraph under the heading Purpose of Report.

Do you see that?

A. Yes.

Q. And looking at that first sentence and just reading the second part, you were asked to render an expert opinion on whether or not residential soil contamination in the area was caused by releases from the USMR smelter that operated during the period 1906 to 1986 as a primary and secondary copper smelter; is that right?

A. That's what it says.

Q. And does that accurately summarize what you were asked to do in this case?

A. Yes. I was asked to determine whether or not the USMR impacted soils in the class area and to what extent.

Q. And is that what you ended up doing?

A. Yes.

Q. Did you end up doing anything

else besides that?

A. Yes. I was also asked to consider in the process alternate sources of contamination that might be present in the class area.

Q. And did you complete your work in terms of an assessment of potential alternate sources to your satisfaction?

MR. GERMAN: Objection to form.

You can answer.

A. I did. I concluded that the smelter is the primary source and the other sources are minor compared to the smelter.

Q. And you felt like that you had enough data and analytical work and the like to reach a conclusion to a reasonable degree of scientific certainty that all of the alternate sources are minor; is that correct?

MR. GERMAN: Objection.

A. Yes.

MR. GERMAN: You can answer.

A. Yes. My view was a view looking at possibilities, for example, leaded gas, pesticides, fill, etc., but in a very general way, and comparing them to the mass

of contaminants that more than likely would have been delivered from the smelter. That's the approach I took.

Q. And there was no additional data or information that you needed in order to address that question as part of your report; correct?

A. In my opinion, I didn't need any other data.

Q. Okay.

Dr. Flowers, approximately what are your billings to date on this case?

A. I saw this in some of the other depositions. I estimate roughly $70,000.

Q. And what's your hourly rate?

A. $350 an hour for general work and $400 an hour for interrogation.

(Exhibit 544, curriculum vitae of George C. Flowers, marked for identification, as of this date.)

Q. I hand you a document that I've marked as Exhibit 544.

Do you recognize that document?

A. Yes. This is the CV that I submit to clients for consulting work.

Q. Do you have more than one CV?

A. I have an academic CV, which would have all the committees I'm on, all the courses I teach, all the positions I've held within the university, which are mentioned on the front page here also, so it's -- it would be all the grants, all the, you know, the academic side of my life as opposed to the consulting side of my life.

Q. And so do you have more than two CVs, you've got an academic --

A. No. I just have two. I have an academic and I have a consulting CV.

Q. Okay.

And it's correct to say that the -- well, let me ask another question first. Is Exhibit 544 an up-to-date version of your consulting CV?

A. Yes.

Q. And it includes all the employment that you had over the course of your career?

A. No. Not all of it. It goes back about five years. It says 2014 to present. Those are the cases that I've

testified in.

Q. Oh, I'm sorry, I meant to say your employment in terms of like not your testifying experience, but --

A. Okay.

Q. -- but the jobs that you've held.

A. But my jobs? Most of my work is in litigation. Occasionally, a very minor amount, I might be asked by an engineering company to identify some strange thing in a box of airplane engines like dust, but I haven't had one of those cases -- too long ago. I'm trying to think, when's the last time I had one of those. I think an engineering company asked me to identify some materials -- they were doing a project with the Japanese where they wanted to know the amount of montmorillonite in soil samples for foundations, and there were competing methods, and so we did a trial where we compared their method to a different method and I gave them my results using the different method and they went off and did whatever the Japanese company decided to do with it.

Q. And what kind of methods were those? Were those chemical methods or --
A. Well --
Q. -- microscopy methods or --
A. Well, there is a method called the methylene blue method for determining montmorillonite and then you can do an x-ray defraction analysis of the clay and both methods are semi-quantitative, and what you want to do is correlate the mechanical properties of the clay with the composition of the clay, particularly the amount of montmorillonite in it, and then they would do amelioration, they would add, try to stabilize the soil because the soil is in this site what it is, so that's really what they were trying to get at was try to get a better -- higher strength soil in an area that had really bad soil, so they had -- the approach they took was to look at what was the composition of the clay that they had under -- at this site.
Q. And is it correct to say that as a general matter in geochemistry, source identification like what you were just

talking about typically will focus on identifying compositional features, that is, what are the chemicals and compounds that are present, morphological features, I mean, what did the particles look like in terms of their shape, and then the size of the particles, aren't those three things that typically are part of a source identification in geochemistry?

A. I wouldn't --

MR. GERMAN: Objection. You can answer.

A. I wouldn't say that they're typical. I would say it really depends on the particular study what you're doing.

Q. But in this particular study that you did for the engineering company, at least two of those components were a significant part of it in terms of looking at the morphology and the compositional nature of the samples?

A. We didn't look at morphology. We looked at the mineralogy of the sample, and that's the information that we delivered to the company, the relative percent of each

constituent.

Q. Well --

A. We did not look at SEM work, we did not do any of that.

Q. Does x-ray defraction give you information about morphology?

A. No. I would qualify that with the exception that if you prepare the sample poorly, the x-ray defraction will tell you something about it, you know, for example, you can take some of this rock and you grind it, but you don't grind it well, you'll get a mediocre x-ray defraction pattern. On the other hand, if you grind it thoroughly, you will get an excellent x-ray defraction. So in that sense, indirectly it tells you something, but it does not tell you anything about the unaltered particle.

Q. Okay.

Other than your consulting work, your career has been spent in academia; correct?

A. Yes.

Q. You got your advanced degree training at California Berkeley; correct?

A. Yes.

Q. And then you spent the bulk of your career in academia at Tulane in New Orleans; correct?

A. Yes.

Q. Now, are you still a professor at Tulane?

A. Yes.

Q. Okay.

Do you have an active class load?

A. Yes.

Q. Okay.

What did you teach this last semester?

A. I taught weather and climate and petrology.

Q. And what's petrology?

A. Petrology is the study of rocks.

Q. Okay.

A. So we might -- I gave them a piece of this to look at (indicating).

Q. And you consider yourself an expert in geochemistry; correct?

A. Yes.

Q. And you consider yourself an

expert in geology; right?

A. Yes.

Q. Do you consider yourself an expert in civil engineering?

A. I have a degree -- master's degree in civil engineering, more focused on soils and foundations rather than bridges, say.

Q. Okay.

A. So I would say I'm a civil and environmental engineer, more toward the environmental side.

Q. And the focus of that engineering expertise is on sort of the structures and lithology of soils; is that right?

A. Yes. But it's also, because it's an engineering degree, it gets me an entrée into any type of engineering report or discussion or mechanism of -- because engineers have a common curriculum at the base and then they specialize in civil or chemical or whatever, and so it allows me to understand industrial processes, if they're described clearly, to look at plans, but I do not do any creation of plans, like no

design work.

Q. You don't have a degree in chemical engineering, do you?

A. No.

Q. And you have never worked in a field where you either designed or operated chemical processing units; correct?

A. No.

Q. And you don't have a degree in mechanical engineering, do you?

A. No.

Q. And you never worked in a field where you designed or operated mechanical operating equipment like pumps and heat exchangers and the like?

A. No.

Q. Are you an expert in environmental freight and transport?

A. Yes.

Q. And when you talk about environmental freight and transport, does that include expertise in the dispersion and deposition of air emissions?

A. It -- like I was saying, the engineering degree, I took courses, I teach

meteorology, I teach weather and climate, I teach air pollution, I understand the concepts surrounding those subjects, and that allows me to read reports and understand them, but I would not -- I'm not an air modeler per se, but I can read an air modeling report and understand it.

Q. And you're also not an expert in the creation and evaluation of air emission estimates, are you?

MR. GERMAN: Objection to form.

You can answer.

A. Um, I'm not sure what you're asking there.

Q. Do you understand the concept of an air emissions inventory?

A. Yes.

Q. You can't and you're not an expert in the creation of an air emissions inventory for an industrial process, are you?

A. If we're talking in very general terms where all the data is available, I'm not an expert in that. The problem in this case is the data isn't available.

Q. But the answer to my question is

is that's not something that you're an expert in?

A. I don't hold myself out as an expert in doing that; no.

Q. Did you look at Mr. Sullivan's air emissions inventory in this case?

A. I read his report.

Q. Did you look at any of the underlying data that formed his emissions inventory?

A. Most of the -- most of the air models that I have seen rely on the EPA estimates of emission rates, emission factors for various industries as opposed to direct measurements. Since the plant in this case doesn't exist anymore, such data, particularly through the historical record, is not available.

MR. SUTHERLAND: Objection. non responsive.

Q. My question really was: Did you look at the basis for Mr. Sullivan's emissions inventory in this case?

A. Again, I'm not an air modeler. I read his report and I can understand what

he said, but the details of how he generated those figures, I'm not an expert in that.

Q. Did you do any due diligence on the details that underlie his analysis?

MR. GERMAN: Objection. You can answer.

A. Again, I'm not an air modeler.

Q. And so the answer to my question is no, you didn't do any due diligence?

MR. GERMAN: Objection.

A. No, the answer is I am not an air modeler.

Q. Are you an expert in source identification of minerals and chemicals in soil?

A. Yes.

Q. And what, when you're doing that kind of work, what are the tools that you use to do it?

A. Well, if you're doing minerals, you have to determine the mineralogy, and I've written papers looking at heavy minerals as an indicator of the source regions of sedimentary rocks, so if you have a course sand, there's a light fraction,

there's a heavy fraction. The light fraction is quartz, that doesn't help you, the heavy fraction may be things like tourmaline, staurolite, ilmenite, etc., and by looking at that suite of heavy materials, you can determine something oftentimes about what the source is. For example, in a young sand that's only been eroded and weathered once, the heavy mineral suite will have a lot of unstable heavy minerals in it. However, if it's a multi-cycle sand that's been weathered several times and eroded several times, the suite will only have the most resistant heavy minerals in it. So I've done that type of work where I've looked at mineral speciation and made comments about source regions for sedimentary rock units.

Q. What analytical tools do you use to separate out the various types of minerals?

A. Heavy liquids, tetrabromomethane.

Q. So it's a density test?

A. Yes. It's a density test.

Q. Are you an expert in the identification of the source of heavy metals

in soil?

A. Yes.

Q. And by heavy metals, I would include lead. You would agree that that's a heavy metal?

A. Sure.

Q. What about arsenic? Is arsenic a heavy metal?

A. Yes.

Q. And so are you an expert in the identification of lead and arsenic in metal, the source of it?

A. Yes.

Q. And have you done that kind of analysis in other cases before?

A. Yes.

Q. Did you do that kind of analysis in the Patrick versus First Energy Generation case?

A. Let me see. I don't see that one on the list. Who was the -- who was the defendant?

Q. First Energy Generation. It was --

A. Was that Shipping Port?

Q. It was a power company in Pennsylvania.

A. Yeah. Shipping Port. That case was a fly ash case, deposition of fly ash and gypsum on residential properties. There were upsets in the plant and it generated white rain and black rain that deposited material from the power plant on residential properties. So in that case, I looked at the particles that were collected with white samples and looked at them with the electron microscope, documented that fly ash was indeed on the properties, gypsum was indeed on the properties, and pretty much that was the extent of what my part of that case was.

Q. And in identifying the fly ash particles, you used scanning electron microscopy to identify the size of the particles, for example; correct?

A. Size and chemistry.

Q. Yes. So you looked at --

A. And morphology.

Q. Right. So the big three things that you looked at were are the size of the particles consistent with the air emissions;

correct?

A. Yes.

Q. Is the morphology of the particle, the shape of the particle consistent with the air emissions; correct?

A. Yes.

Q. And then you looked at what was the chemical composition of the particle consistent with what you would expect from a coal fired power plant; correct?

A. Yes.

Q. And you also opined in that case that those fly ash particles originating from coal combustion contain arsenic; right?

A. Yes.

Q. And that arsenic was one of the chemicals of concern with respect to potential contamination of those properties; correct?

A. Yes.

Q. In looking at the source of heavy metals and soil, have you ever used metal ratios as a technique to evaluate the source of the metal?

A. Yes; but my experience is that depending on the nature of the source, it

may be helpful, it may not be helpful.

Q. Can you remember a case where you did use metal ratios to identify the source of heavy metals?

A. I tend to shy away from ratios because they're very difficult to do statistics with, and I don't remember a case where I considered them to be a definitive answer.

Q. And I didn't really ask if they were a definitive answer, I just meant where you may have used metal ratios as a line of evidence in a number of other techniques. Do you remember a case like that?

A. No, I don't think I've ever used ratios, but if you -- correct me if I'm wrong.

Q. Okay.

You didn't use or evaluate metal ratios in this case; correct?

A. No.

Q. In terms of evaluation of the source of the lead and arsenic in soil, do you use geostatistics?

A. No. I did include a diagram that was geostatistical in nature, that

would have been the contour map with the -- in the AOC.

Q. You would agree with me that geostatistics are sometimes used as a way to identify the source of heavy metals in soil; correct?

A. Sometimes.

Q. And those geostatistics can include things like, you know, are you familiar with variograms?

A. Yeah. Well, let me clarify something. The word geostatistics can have two meanings. One meaning is the application of statistics to the geological sciences. There's another form of definition of it, which is the one you're talking about, where you are using contouring as a mechanism for estimate interpolation, and that's where things like kriging, inverse distance come into play, etc., and the variogram would be part of kriging.

Q. Well, thank you for that because I think that helps. Let's talk about both of those things then.

A. Okay.

Q. So the broader category of just statistics in this source analysis process, you typically use that as part of the suite of analytical tools in identifying the source of lead and arsenic in soil; correct?

A. Right. I would apply statistics through the chemical data.

Q. And in this case, you did exactly that with some Spearman correlation coefficients; correct?

A. Yes.

Q. And there are a number of statistical tools that can be used in a sort of broad definition of what geostatistics might mean; correct?

A. Yes.

Q. I mean, for example, you mentioned that you prefer the use of Spearman correlation coefficients to the Pearson coefficient because we had a non-normal sample distribution; correct?

A. Right.

Q. And you can also look at other statistical methodologies like principal component analysis; correct?

A. Yes.

Q. But you didn't do principal component analysis here --

A. No.

Q. -- right?

A. No. It's kind of redundant with three variables. You don't get a lot. Guess what? The major effect's going to be copper, I can tell you right off the bat. The other two are going to be second and third --

Q. Did you --

A. -- in terms of eigenvalues.

Q. Did you review any of the principal component analysis done by other experts in this case?

A. No.

Q. You haven't seen it?

A. No.

Q. Another thing that you can do is you can do trend analyses like the Mann-Kendall test; correct?

A. Mann-Kendall, maybe I've got it mixed up, but that seems to be a test that -- about normality.

Q. That's your recollection as you sit here, that that's --

A. Right now.

Q. -- a normality test?

A. But I may be wrong about that. Mann-Kendall doesn't seem like trend analysis.

Q. Okay. Well, you could use statistical trend analysis.

A. Oh, yeah, you could fit the data and get a trend line and go to town on it.

Q. But you didn't do that here; right?

A. No. There's so much variability in this data, that the fit would be mediocre at best.

Q. Okay.

And you can also do things like other types of forensic chemistry like looking at isotopes and other things like that; correct?

A. You could do that.

Q. But you haven't done that here?

A. No.

Q. Are you an expert in environmental site assessment for remediation purposes?

A. I am not a remediation expert, but I can take data and determine whether or not it is above screening levels and probably needs to be looked at by a licensed remediation specialist.

Q. But you wouldn't hold yourself out as an expert in setting those screening levels or clean-up levels; correct?

A. Those levels are set -- promulgated by regulatory agencies. They're already out there.

Q. And you would defer to the regulatory agencies as to the appropriate clean-up level; correct?

A. I would. I would defer to them. But they change their minds.

Q. Fair enough.

You're not an expert in risk assessment, are you?

A. No.

Q. And are you an expert in the New Jersey environmental regulations?

A. I have enough experience where I can read those regulations, but I don't have them memorized, I can't quote them to you,

etc.

Q. Are you rendering any opinions regarding the adequacy of the lead clean-up level that's established under New Jersey regulation?

A. The one opinion that I am advancing is simply an observation that clean-up for lead levels are decreasing and New Jersey has employed soil screening levels less than 400, for example, 200. If you go to the West Coast, it might be 80. So there's not unanimity about what the magic level is to clean up lead in soils.

Q. But you're not rendering an opinion and don't have an expertise to render an opinion regarding the underlying toxicology and scientific analysis that goes into the debate about where those clean-up levels ought to be?

A. No.

Q. That's not your --

A. I'm not a toxicologist.

Q. And so, for example, do you understand that lead clean-up levels are generally set by regulatory agencies and

toxicologists based upon a model that's known as the IEUBK model?

A. Yes.

Q. You're not an expert in what the particular input parameters ought to be in order to run the IEUBK model, are you?

A. No.

Q. I think you told me earlier that the bulk of your consulting practice is in litigation; correct?

A. Yes.

Q. And when you say litigation, are you -- do you primarily mean that you're functioning as a testifying expert like you are here in this case today?

A. Yes.

Q. And is it correct to say that the vast majority of your work as a testifying expert has been testifying on behalf of plaintiffs?

A. Yes, that would be true. I do have one case that is for the defense, it's a trip and fall case for the city of Kenner that involves subsidence, and I work for the defense.

Q. In your report, you mention a number of other smelters. One of those smelters is the smelter in West Virginia; correct?

A. Yes.

Q. And were you a testifying expert in litigation related to the Spelter smelter?

A. Several times.

Q. And what were the nature of your opinions for that litigation?

A. That the smelter had contaminated the class area in the Perrine case. The other two cases I cannot talk about because they've been sealed.

Q. Okay.

The Spelter smelter was a zinc smelter; right?

A. Yes.

Q. And that's a -- that's a fundamentally different smelting process than a copper smelting; correct?

A. I would disagree with that. I think they both fall under extracted metallurgy using a technique called pyrometallurgy that involves reduction of

ore minerals to native metal. So in that sense, they're very similar chemically. Different, cross out copper, put zinc.

Q. But the unit operations that you go through --

A. Yes. They're different.

Q. And --

A. But the chemical processes are the same.

Q. And the feedstocks are fundamentally different; right?

A. Sure. One you're refining zinc, you may be refining zinc as a green ore with sulfur in it, or you may be refining zinc as a calcine where the zinc is bound to oxygen in the form of zincite and that eliminates a step driving off the sulfur, which means that you simply reduce the zinc oxide to zinc metal at a temperature high enough where it is a vapor, and then you condense the zinc vapor to form slab zinc, which is in German the word spelter.

Q. And none of those processes occur in a copper smelter, do they?

A. No.

Q. The feedstock in a zinc smelter will have different, I don't know if contaminant is the right word, but unusable materials than the feedstock to a copper smelter; correct?

A. I wouldn't say different. I would say related. In certain types of deposits, which are called polymetallic sulfide deposits, all kinds of sulfides can occur together, but generally when you're doing zinc you want to mine the highest tin or ore that you can find, which is a zinc deposit, usually lead zinc deposit, galena sphalerite, and so -- but it also has a lot of other minerals that are present in it that are sulfides, arsenic sulfides, cadmium sulfides, contaminants that occur. So between the two types, a copper and a zinc smelter, the common denominators are lead and zinc -- I mean, not lead and zinc, lead and arsenic. They occur in both types of smelters.

Q. Does arsenic occur in appreciable amounts in a secondary copper smelter?

A. Depends what you're feeding the

beast.

Q. Are you aware of any feedstock for a secondary copper smelter that would include appreciable amounts of arsenic?

A. Usually feedstock is not analyzed. There's no data.

Q. So you don't know?

A. There's no data. I don't know.

Q. How long did the Spelter smelter operate?

A. I think it opened in 1911 as a primary smelter and then maybe '71 or ish it transitioned to a secondary recycling zinc smelter, made things like cadmium dust and, you know, recycled zinc and like that, so ultimately I think it closed down around -- totally around 2000. So 1911 to 2000 in various incarnations. Is that what you say in my report? I have it in there. We can go to it and get dates if you'd like.

Q. You're welcome to consult it if you need to.

A. Well, I'm just giving you off the top of my head. It's probably the same general period of time that the Carteret

smelter was operating. You know, not all of them started in the 20th century. Some of the -- some of the zinc smelters are even older than that, the late 19th century.

Q. How many smokestacks did the smelters in the Spelter smelter have?

A. Let's see. Well, again, in various incarnations, things changed over the years, I remember one or two major stacks.

Q. How tall were they?

A. I don't remember how tall they were.

Q. Did you do any comparison between the location of the West Virginia zinc smelter and Carteret in terms of whether the weather patterns were similar?

A. No. The situation is such that it really wasn't part of my charge.

Q. Okay.

How -- what was -- what was the production out of the zinc smelter in Spelter?

A. At one time, it was -- when it transitioned to a vertical retort from horizontal retort, manually charged retorts to a vertical retort, it was the largest in

the country at one time.

Q. And do you know how that compares to the production rate of the primary smelting that took place in Carteret?

A. No. I didn't compare those two.

Q. That wasn't part of your charge?

A. No. I didn't compare those two. The reason I -- I -- my purpose in bringing up Spelter and the Rustin was to bring up two pyrometallurgical smelters. Not all smelters use fire to extract metal. Some use electrochemistry to extract metal. And of the different families of smelters you have, the ones that produce the most pollution are the pyrometallurgical smelters.

Q. Did you compare the arsenic content of the feedstock to the -- of the smelter, zinc smelter, to the arsenic content of the feedstock in the Carteret smelter when it ran as a primary copper smelter?

A. The only indication in Spelter that there was some idea what was in the feedstock was looking at what was called the pile. The pile was slag. And when you

analyzed the slag, you found that in the slag, which was one component of the waste, there's all kinds of -- there's fugitives, there's stack emissions, there's all kinds of stuff that goes on, runoff, erosion, etc., but when you looked at that, arsenic was a major contaminant of the feedstock.

Q. Did you compare that data point to any data point in Carteret?

A. I didn't find any data on what the composition of the slag was, you know, in Spelter, the characterization was very, very thorough, thousands of samples, and I felt it was fairly reliable. I found nothing on that order of magnitude for Carteret.

Q. Did you ask for that information for Carteret?

A. I looked at the sampling locations, the map of sampling locations onsite, and I could tell by looking at it that it wasn't anywhere near the density of sampling, I wouldn't think, and it was a little bit different kind of sampling. It was a composite of all the contamination that was on the site. So it would have

included fugitives, it would have included stack emissions, it would have included slag, it would have -- anything that would have come down or been moved into or thrown out the door from the smelter. The Spelter smelter, they basically ran the charge through the smelter, zinc was pulled off as product and then this flaming mass of whatever was left was put into a little small mining railroad car, was wheeled out and then dumped on the ground, and they operated that way. So there was this huge pile of spelter waste that could be sampled and analyzed.

Q. And as far as you know, the facility in Carteret didn't have a unit operation similar to that in its copper smelting process; correct?

A. Well, they would have had to clean out the cupola, for example, somehow.

Q. But as far as you know, they don't have -- they didn't have anything like what was happening at Spelter?

A. I would not say they're one for one exactly the same. They're different --

there are differences between spelter sites.

Q. And in terms of evaluation of the loadings of arsenic and lead and the other contaminants of concern, you didn't do any sort of quantitative evaluation to compare Spelter to Carteret; correct?

A. No. My purpose for including Spelter was demonstrative, that contamination is observed with pyrometallurgical smelters and that that creates a plume and the plume is significant in its geographic extent.

Q. The other smelting facility that you refer to in your report is the Asarco smelter in Rustin; correct?

A. Yes.

Q. And is your sort of purpose in including that report the same as what you just described for Spelter?

A. Yes; but it's closer to the Carteret smelter because it's a copper smelter. It didn't start out that way. It started out as a lead one and then they changed the feedstock to a copper feedstock. Even at one time they produced arsenic. You know, most of these, they diversify over

time producing different kinds of materials.

Q. And the reason or part of the reason why the Rustin smelter produced arsenic was because it had a very high arsenic content in its feedstock; correct?

A. If they produced arsenic as a product, one would say that that was probably correct.

Q. And did you compare the arsenic content of the feedstock in Rustin to the arsenic content in the feedstock when Carteret ran as a primary copper smelter?

A. No. Again, my purpose in including those two was more to get the point across, that pyrometallurgical smelters create large geographic plumes of heavy metal contamination.

Q. Did you compare how long the Tacoma smelter or how long the Rustin smelter operated as a primary copper smelter versus how long the USMR smelter operated?

A. They're generally, you know, like I said, it started off as lead and then it transitioned to copper and it remained copper all the way through it when it closed,

it closed in the 1980s, it began in the early 1900s. It's in here. So they overlapped.

Q. So is it your testimony that the Rustin copper smelter operated as a primary copper smelter for a similar period to the period that the Carteret USMR facility also operated as a primary copper smelter?

A. I wouldn't say that. I would say that their operation was primarily as a copper smelter during their history, and their histories overlapped.

Q. Okay.

Did you do any kind of quantitative comparison in terms of the total production in terms of the amount of production from Rustin versus the amount of production --

A. No, I didn't.

Q. Did you do any comparison between how many stacks and how tall the stacks were comparing Rustin to the USMR facility?

A. I did make one note that the Rustin stack was at one time the highest in the world, over 500 feet, but other than

that, no.

Q. Did you make any comparison between the meteorology around the Rustin smelter as compared to the meteorology around the USMR facility?

A. No. Again, my purpose was to document the fact that smelters create large heavy metal anomalies everywhere.

Q. Other than Rustin and Spelter, did you look at any other particular smelters?

A. Not in this paper, but I've worked on a number of other smelters.

Q. Which ones?

A. I've worked on the Blackwell smelter in Blackwell, Oklahoma. Did you depose me in that one?

Q. I did. I did.

And so, Dr. Flowers, what did you do in the Blackwell smelter?

A. Well, there are two components to the Blackwell, there were two cases, both of them involved Kay County, Oklahoma. The first one was soil sampling, and what I was doing was sampling the right-of-way because the county was concerned that workmen for

the city would be exposed if they dug and got dirty and etc. because the soils were contaminated, and in that one I sampled the city, the right-of-ways, and then I found out what background was in the same general area, and that was settled, as far as I knew. The second case involved the disposal of retort fragments. The smelter provided both to the city and individuals retort fragments, so these retorts, as you know, are clay vessels, and they were manually charged with reductant, which is usually coke or something like that plus the ore, and then they're heated and the zinc is tapped off manually and poured into a mold, etc., but they have a finite lifetime because they're ceramic vessels, and so when they're -- they develop cracks, sometimes they even exploded periodically, that must have been spectacular, they would have to dispose of them and they had a pottery shop, they made new ones and recycled them. Meanwhile, they're collecting a whole bunch of shards, if you will, rather big shards of pottery lined with smelter waste, and they

gave them to the city and other people and they got dispersed throughout Kay County. They were used as road metal, you can find them alongside of the road, you can find them in around, say, drainage pipes, I found them there, you can find them in creeks, sometimes in large accumulations, and there was a dispute on whether or not they were a nuisance and whether or not they needed to be cleaned up.

Q. And it's correct to say that both of the projects that you worked on on Blackwell, you didn't evaluate the historical impact from air emissions from that facility; correct?

A. I looked at the end result, which would be what was in the soils.

Q. Well, if I understood the testimony that you just gave in a relatively long answer, mainly you were looking at the waste materials like the broken retorts; correct?

A. Well, there are two cases. Which case are you talking about?

Q. So was there a case where you

evaluated soils for --

A. Yes.

Q. -- historical --

A. That was the first case I described.

Q. Okay.

A. The second one was the retort case.

Q. And where -- the first case that you described was exposure of Kay County workers on the road; is that right?

A. That's the way it was presented to me. The county was concerned that there was an added risk and exposing people working along the right-of-way, telephone, plumbing, drainage, whatever, if they didn't know what was in the soil, they might be accidentally exposed.

Q. And it's your testimony that as part of that work, you evaluated potential lead and arsenic contributions to the soil from historical air emissions?

A. Yes. And I also determined background levels for that area.

(Exhibit 545, report entitled

Chemical Stability of Blackwell Zinc Smelter Waste in Kay County Oklahoma by George C. Flowers, Ph.D., May 21, 2013, marked for identification, as of this date.)

Q. I show you a document that I've marked as Exhibit 545.

Can you identify Exhibit 545 for the record?

A. It's entitled Chemical Stability of Blackwell Zinc Smelter Waste in Kay County, Oklahoma by George C. Flowers, May 21, 2013.

Q. And is Exhibit 545 the expert report for the work that you've been describing related to exposure of workers on Kay County roads?

A. Nope.

Q. This is the second case?

A. This is the second case.

Q. Did you prepare a report in connection with the first case?

A. No.

Q. Did you do any sort of quantitative comparison between the operation of the -- historical operation of

the Blackwell smelter and the USMR smelter as part of this case?
A. No.
Q. So the purpose in, you know, sort of mentioning the Blackwell situation in your report here was similar to --
A. I didn't --
Q. -- or I don't even know, did you --
A. I didn't mention it.
Q. You didn't mention it. Okay. All right.
Other than the Blackwell smelter, any other smelters that you worked on?
MR. GERMAN: Objection to form.
You can answer.
A. I currently am involved in a project at the attorney work product stage.
Q. Okay.
And so that's not something that -- you're still covered by privilege --
A. Yes.
Q. -- is that right?
A. Yes.
Q. All right.

Anything else other than that project?

A. No.

Q. Okay.

Have you ever evaluated lead paint as an alternate source of lead -- for lead concentrations in soil other than this case?

MR. GERMAN: Objection to form.

You can answer.

A. I -- I don't remember any where it really was an issue, so -- I was asked to do it in this case.

Q. So as you sit here today, your best recollection is that this is the first time you've tried to look at lead paint as a possible source for lead in soils?

A. I mean, it's always --

MR. GERMAN: Objection to form.

You can answer.

A. It's always out there as a possibility, but, in my opinion, compared to a smelter which produces 70,000 tons of copper from a -- what may be a low-grade concentrate, there's a tremendous amount of

waste, tons, produced by the process, and it far outstrips lead paint as a source.

MR. SUTHERLAND: Objection. non responsive.

Q. My question really was: As you sit here today, you cannot remember another project other than this one where you've done a forensic evaluation to determine whether lead-based paint accounted for all or part of the lead present in soil?

MR. GERMAN: Objection to form. You can answer.

A. That's correct.

Q. Have you had a project where you worked with the New Jersey Department of Environmental Protection?

A. Yes.

Q. When was the last time you had a project where you were working directly with the New Jersey Department of Environmental Protection?

A. Well, it depends what you mean by work with. I've been in projects -- because I've worked in New Jersey on several different cases, I've had to interact with

NJ DEP and we've had meetings with them, so I would -- but I wouldn't call it work with except in the meeting we talked about things, and like that; yeah.

Q. When was the last --

A. But not being hired by them to do a project or anything.

Q. When was the last time you had a meeting with NJ DEP?

A. Probably it was -- oh, geez -- more than ten years ago.

Q. Do you remember the project?

A. It was the Honeywell site in Elizabeth, I think it's Elizabeth; yeah.

Q. And what was --

A. On the Hoboken.

Q. And what were the contaminants of concern there?

A. Hexavalent chromium.

Q. And what was the purpose of the meeting with the NJ DEP?

A. We were talking over different analytical methods for detecting hexavalent chromium in soils.

Q. And what were the analytical

methods that were under discussion?

A. Well, you know, they're -- EPA has promulgated probably three different methods. One is alkaline extraction followed by a colorimetric test, the other one essentially is an alkaline extraction followed by a clean-up that removes interfering organics, and then colorimetric determination, and the final one would have been an isotopic analysis. Chromium has a number of different isotopes. That's extremely complicated, and we were talking about whether or not it was -- that's one thing we talked about, whether or not it was worth it to go there for a large site that was being remediated like the Honeywell site.

Q. And was one of the purposes for those analytical to do forensic evaluation of where that hexavalent chromium came from?

A. No. It was all said and done, it had been litigated all the way out.

Q. So it was just --

A. The remedy was in place and they were executing.

Q. Okay.
A. And so they wanted to evaluate the remedy in terms of finding a clean edge.
Q. Have you talked with anybody with New Jersey Department of Environmental Protection in connection with this case?
A. No.
Q. You have rendered opinions in the past regarding background concentrations; correct?
A. Yes.
Q. Are you rendering any opinions regarding background in this case?
A. Yes. I give a table where I -- and we can refer to it, it's the first table, where I kind of looked around and saw what people were proposing and thought about them and did an evaluation in my mind about them.
Q. So are you rendering an opinion regarding the quantitative, this is what background is for lead, for example, in this case?
MR. GERMAN: Objection to form.
A. Yes. In my opinion, the natural

background, which is perhaps the most relevant, is less than 20, the arsenic is again less than 20 for sure, probably less than 10, and copper is 20, 30, 40, something like that. Those are the natural background levels.

Q. And are you rendering an opinion regarding the background levels in the proposed class area where background is not only natural background, but also non-site related anthropogenic background?

A. Well, I think that trying to do that in the vicinity of a smelter is wrong. The reason is that the general guidance is to stay away from hazardous waste facilities when you're doing your sampling to try to get background, and so if you use data from the site area, the class area, for example, and try to get a background number, there's no way you'll screen out the effect of the smelter.

Q. All right. Why don't we take a break. We gotta change the video anyway.

THE VIDEOGRAPHER: All right. We will go off the record at 10:08 ending media 1.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: We are back on the record at 10:12. This is media 2 in the deposition of Dr. Flowers.

CONTINUED BY MR. SUTHERLAND:

Q. All right. I'm going to direct you to your report, Dr. Flowers, Exhibit 543, and if you could look at page 12 for me, please.

A. Okay.

Q. And there at the bottom of the page there's an underlined italicized section that starts with Background Soil Loading and Soil Spinning Levels.

Do you see that?

A. Yes.

Q. And the first sentence states, and this is your statement, generally industry is not required to clean up below the background levels of soil constituents.

Did I read that correctly?

A. Yes.

Q. And that's generally consistent with your experience; correct?

A. Yes. Natural background more specifically.
Q. But it doesn't say natural background. It says industry --
A. But that's what they say.
Q. They say natural background?
A. Yes.
Q. That's your experience?
A. Yes.
Q. Even --
A. It's in the deposition -- one of the depositions.
Q. Even if it's in non-site-related -- if the contamination comes from non-site related sources?
MR. GERMAN: Objection to form.
You can answer.
A. Well, if you look at in the deposition, there is a quote, I think it's Dr. Singh, that says natural background is -- absolutely we don't clean below that, anything else is subject to all of these different processes, regulatory processes, litigation, etc.
Q. Is it your testimony that you

know from your own, you know, expertise that that's the rule that gets applied in New Jersey?

MR. GERMAN: Objection to form.
You can answer.

A. Again, I'm pretty sure they do not require you to clean below background, natural background.

Q. Did they require you to clean below background that includes non-site-related anthropogenic entities?

A. They might.

Q. You don't know whether --

A. If you can -- if you can demonstrate, you know, that -- convince -- if you can't convince them that it is an anthropogenic background, they might make you clean it up.

Q. Well, do you know if the State of New Jersey has established background levels that include both natural background and general area sources of anthropogenic impacts?

MR. GERMAN: Objection. You can answer.

A. There are a number of papers where clearly there's some anthropogenic data mixed in with more natural background numbers, so they have a marble cake answer.

Q. And do you know whether or not the statutory definition under New Jersey of the natural background level includes influences of non-site related anthropogenic entities?

A. Not if it's natural.

Q. Do you know what the statute says?

A. It says natural background, and to me my interpretation of natural background is, is that it would be the amount that's present due to the weathering of the underlying bedrock in the absence of any of man's anthropogenic inputs, so that's the natural background.

(Exhibit 546, study entitled Ambient Levels of Metals in New Jersey Soils by Paul F. Sanders, Ph.D., bearing Bates Nos. NEWFIELDS_CNJ00008751-8756, marked for identification, as of this date.)

Q. Okay. Well, I'm going to hand

you a document that I've marked as Exhibit 546.
A. Okay. Oh, this guy.
Q. Have you seen Exhibit 546 before?
A. I have.
Q. And Exhibit 546 is a study of the Ambient Levels of Metals in New Jersey Soils by Paul F. Sanders; correct?
A. Yes.
Q. And Paul F. Sanders is an employee of the Department of Environmental Protection; correct?
A. That's correct.
Q. And if you look under the introduction, you see it states there current New Jersey law requires that the NJDEP determine background levels of contaminants in soils and that remediation of contaminated areas shall not be required below regional natural background levels for any particular contaminant; correct?
A. Right.
Q. And then the next sentence goes on to state: Natural background level is further defined as the concentration of a contaminant consistently present in the

environment of the region of the site and which has not been influenced by localized human activities.

Do you see that?

A. Yes.

Q. And then the next sentence goes on and states: Therefore, naturally occurring constituents in soil and those resulting from regional deposition are included, but not those from point contamination sources.

Do you see that?

A. I see that, but I see those two sentences as contradicting each other.

Q. Well, but you would agree with me that Mr. Sanders as an employee of the Department of Environmental Protection published this article and says that in -- and states that under New Jersey statute, that anthropogenic activities resulting from regional deposition are included in background; right?

MR. GERMAN: Objection.

A. You would have to show me the statute.

Q. You can agree with me that's what this paper says?

A. That's what it says, but show me the statute.

Q. Okay.

Do you know if the background numbers that are reported in Exhibit 546 include regional anthropogenic impacts for lead?

A. Absolutely.

Q. And you cited for your background table the BEM systems study that was done in 1970; correct?

A. Right.

Q. And I assume that since you cited it in your paper, you believe it was a well done study?

A. I thought it was a well done study in the sense that they made an effort, a good faith effort to try to figure out what the natural background was in a state where it's quite a challenge to figure out what natural background is. New Jersey's heavily industrialized and particularly in this area, the urban Piedmont area, there

are numerous hazardous waste sites, numerous emitters, and it's a real challenge to try to keep those out of a data set trying to figure out what natural background is.

Q. Do you know how they chose their sample sites for the 1997 urban Piedmont study?

A. Yeah. I think they looked at a variety of different land use types. They tried to stay away from point sources where they could identify them. But when you're taking a soil sample, you don't know for sure what has happened, where that soil sample has happened. You only know after the fact, after you've analyzed it.

Q. What type of properties did they sample?

A. They sampled urban, suburban, farm, agricultural. For example, they stayed away from a golf course because they put a lot of chemicals on a golf course to maintain the turf. They looked at a variety of different ones. I thought they did a reasonable approach to a difficult problem in New Jersey.

Q. So it's your testimony that the 1997 study for the urban Piedmont sampled farms?

A. Well, I don't know whether they actually sampled farms. They -- you know, I'd have to review it. They might have, you know, they sampled a variety of different land use types.

Q. And so it's your testimony that the 1997 study included rural samples?

A. Yes. See, if you sampled up in the industrial corridor, your background would be blown off of the face of the earth. If you sampled just in the farms -- not farms, but rural areas, you would get a better estimate of what would be derived from the rocks that are in this area.

Q. Did you evaluate the individual data points that were reported from the 1997 BEM study cited in your report?

A. Not one by one. I looked at some of them and noticed that this cannot be a background number.

Q. You discussed in your report the upper confidence limit of the data that was

reported in the 1997 BEM study; correct?

A. Yes.

Q. Isn't it correct that the regulatory agencies when they're looking at background, they don't use the upper confidence limit, they use the upper tolerance limit; correct?

A. Not necessarily. I've seen it both ways.

Q. Have you seen what New Jersey does?

A. New Jersey probably does it with an upper tolerance limit. West Virginia does it with an upper tolerance limit. My problem with an upper tolerance limit is that unless you know exactly the shapes of the distributions between contaminated and pristine or natural, whatever word you want to use, you don't know the degree of overlap between the two. So if you use a low probability estimator, which is the 95th percentile, the odds of you being right are not very large because it's not a very probable answer, and there can be significant overlap of contamination way down below it,

so the mean is a more probable answer, and to give some error, you use the upper confidence limit of the mean, I think that's a better measure of characterizing the population. In fact, the mean is the best estimator of the population.

Q. Well, Dr. Flowers, it's correct to say that even if we're looking at natural background the way that you defined it, not the way New Jersey has defined it, that the background concentrations are distribution; correct?

MR. GERMAN: Objection to form.

You can answer.

A. Sure.

Q. And that distribution may be a normal distribution or it may be log-normal or it may have no statistical character at all; correct?

A. It has some statistical character, whether you can describe it or not with an equation.

Q. But notwithstanding whatever that distribution happens to be, if you're looking at the mean, then some percentage of

the natural background samples that you got are going to be greater than that value, just by definition; right?

A. Sure.

Q. And so if you establish a clean-up level based upon the mean, then you are making a decision that you're going to be cleaning up some concentrations that are close to that clean-up level that very likely may be natural background; right?

A. It's a possibility. However, you know, when we're talking about clean-up, it depends on your philosophy. Is your philosophy to err on the side of caution or is it to err on the side of just leaving contamination in place.

Q. And what -- I mean, what we're really talking about here is that your philosophy using the mean or the upper confidence limit is different from those regulatory agencies that choose to use the upper tolerance limit; correct?

MR. GERMAN: Objection to form, foundation. You can answer.

A. Yes, it is. So to turn your

statement around, you could leave contamination in place with the approach that you're advocating, and we don't know what impact that might have on a human population. I would prefer to be more conservative relative to the human population rather than the responsible party.

MR. SUTHERLAND: Objection. non responsive to the last point.

Q. Dr. Flowers, have you spoken with Mike McNally?

A. No, I haven't.

Q. Do you know who he is?

A. Yes. He's the licensed remediation guy.

Q. Yes. LSRP?

A. Yeah.

Q. I don't know what it stands for either.

Did you read Mr. McNally's deposition?

A. Yes, I did, a while back.

Q. Before you issued your report, that is, the May 6 report, had you looked at any of the other plaintiff's expert reports?

A. No.

Q. Had you spoken to any of them?

A. Which date are you talking about? May 10?

Q. The first one, May 6.

A. The first one?

Q. Yes.

A. Yes. There probably was a conference call with the attorneys where we talked about what we found to some degree, but not extensively, but by then I had written my report, so they didn't -- I didn't rely on them and I'm -- in reading their reports, they didn't rely on me except to say, Dr. Flowers, you know, like I did, a courtesy citation.

Q. Okay.

And before you issued your June 10 revised version, had you read the depositions of Singh and Blum and Rosenfeld and Sullivan?

A. Let's see. The 10th would have been last Monday. I would have read some of them. I don't remember which ones I would have read.

Q. Okay.

A. Anything -- say they came in, and as they came in, I read them.

Q. But you're not relying on any of that deposition testimony --

A. No.

Q. -- in connection with your report?

A. No, I'm not.

Q. Did you read Mr. Bruner's deposition?

A. A long time ago, it seems like; yes.

Q. Did you read Mr. Finn's deposition?

A. Yes. A long time ago.

Q. And did you read Lisa Szegedi's deposition?

A. I don't remember that one.

Q. Okay.

A. Who is she?

Q. She was the remediation -- the principal person at Arcadis overseeing the remediation.

A. I probably saw the name, but

never talked to her.

Q. Okay.

A. Or never read anything except a report. If she wrote the Arcadis report, I might have read it.

Q. And her -- just to be fair to you, her deposition transcript doesn't appear in your materials that you --

A. Okay.

Q. Did you read Jeff Kurtz's deposition?

A. Who is he?

Q. You actually cite him in your report on page 24.

A. Let me see. Maybe that will help me.

Q. It's under -- the first section under Other Possibilities.

A. Jeff Kurtz?

Q. Yes.

A. Yeah, I did read that one.

Q. And if you look at your quote there from Dr. Kurtz's deposition, he talks about his presentation to the LSRP. It's in the italicized section of the report.

A. Yeah. What page was that on?
Q. 24.
(Witness reviewing document.)
A. I don't know what the hell this -- this means.
Q. Okay.
A. I don't think any of that can be proved.
Q. Yeah, well, my question is really more focused than that, and that is you cite -- in the citation that you pulled out of his deposition --
A. Right.
Q. -- he references a presentation that was made to the LSRP.
Do you see that?
A. Yes.
Q. Did you see that presentation?
A. No.
Q. Did you ask for it?
A. No. I don't think so.
Q. Did you get the exhibits to Dr. Kurtz's deposition?
A. I don't think I looked at them; no.

Q. So that wasn't in your mind necessary to render the opinions that you rendered in Exhibit 543?

MR. GERMAN: Objection.

A. I don't --

MR. GERMAN: You can answer.

A. No, I don't -- for the opinions in my report, absolutely not.

Q. Okay.

A. To quote this, you know, this was more a lead-in to the subsequent discussion of, you know, alternate sources. Up to that time, this is the list. I expect the list will get longer.

Q. Well, you recall, Dr. Flowers, that from Dr. Kurtz's deposition that one of the things that he discussed extensively in his deposition is the various lines of evidence that support the presence of other sources of -- particularly of lead.

Do you recall that?

A. I would change your wording. That support the hypothesis of other sources. The presence implies a fact. I don't think, you know, significant other

sources have been proved.

Q. Okay.

But you understand that that was one of the major topics of Dr. Kurtz's deposition; right?

A. I think he looked at those things; yeah.

Q. And it wasn't important to you in evaluating the scientific validity of Dr. Kurtz's points to look at the primary presentation where he put together his support for that?

MR. GERMAN: Objection to form. And I would ask that you put the document in front of him so out of the universe of documents in the case he could see whether he looked at it or not instead of asking him off of memory whether out of the tens of thousands of documents in this case, he saw something.

Q. You can answer the question.

A. Okay. I read his deposition and I wasn't very convinced that he had anything to go with, and so what I took his

deposition as a jumping off point for me to look at independently.

Q. And you felt it was unnecessary to look at the specific support for the lines of evidence that he discussed in his deposition?

MR. GERMAN: Objection. Hold on. Lewis, you are not here to trick the man, you are here to get factual response, so why don't you show him what it is so he knows whether he looked at it or not instead of trying to test his memory as to whether or not he saw that particular document.

MR. SUTHERLAND: Steven, your colleague, Chris Nidel, does this for three or four hours in the deposition in every single deposition. I don't have to show him the document. I'm entitled to know what he knows now without seeing it and I'm --

MR. GERMAN: I know, but you are running the risk of getting answers that are not accurate because he --

MR. SUTHERLAND: I'm not --

MR. GERMAN: -- may have seen a document and he just doesn't recall it.

MR. SUTHERLAND: I'm not going to argue with you. Either --

MR. GERMAN: Okay.

MR. SUTHERLAND: -- lodge your objection or, you know, or if you feel it's necessary, instruct the witness not to answer.

MR. GERMAN: Okay.

MR. SUTHERLAND: But I've asked my question.

MR. GERMAN: I don't have to instruct not to answer, but if you're asking questions about a document, then put the document in front of him so that he could answer the question about it. It makes a lot more sense to get factual information at a deposition.

MR. SUTHERLAND: I'm not going to argue, Steven.

MR. GERMAN: Okay.

Q. Go ahead.

MR. GERMAN: I'm going to instruct the witness not to guess --

THE WITNESS: I'm not going to guess.

MR. GERMAN: -- as to whether or not he saw something out of the universe of documents in the case, and if you need to see the document, ask to see the document, that's going to be my instruction, but you can answer the question to the best of your ability without the document in front of you.

THE WITNESS: Okay.

A. My answer is that in this case it's been kind of different because I prefer to evaluate things with an expert report in front of me rather than deposition, and so a deposition with a bunch of exhibits behind it, I read the deposition and I -- I evaluate it. I consider that a preliminary evaluation. I will not know what I really -- my true opinion of Kurtz's work until I see his expert report, have time to read it and evaluate it. I may go back to the deposition, I may go back to the exhibits, but I would not, you know, he just presents a laundry list and I made note of it and I

tried to make some comments about it in my report. That's what I did.

(Exhibit 547, Evaluation of AOC Boundary for USMR Soil Project, October 26, 2018, by Geosyntec Consultants, bearing Bates Nos. USMF01074655-4750, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as Exhibit 547.

Do you recognize Exhibit 547?

A. No.

Q. Have you ever seen it before?

A. No.

Q. So I'll represent to you that this is the presentation that Jeff Kurtz gave to the LSRP on October 26 of 2018.

A. Okay.

Q. It's your testimony that you've never seen it before?

A. Yes.

Q. And this document that we've marked as Exhibit 547 was Exhibit 454 to Dr. Kurtz's deposition.

Do you understand that?

A. I don't know.

Q. And it's your testimony that you did not look at this exhibit in connection with your review of Dr. Kurtz's deposition; correct?

A. That's true.

Q. Do you know if there were other presentations that were made to the LSRP in October of 2018?

A. Dr. Sullivan alludes to other presentations and other people's work on alternate sources and stuff like that, but I didn't look at any of that.

Q. And do you recall from Dr. Kurtz's deposition testimony that took place in December of 2018 that there were references to presentations made by other experts to the LSRP?

A. I don't remember.

(Exhibit 548, document entitled Overview of Alternate Sources of Copper, Lead and Arsenic, bearing Bates Nos. USMR01155853-01155926, marked for identification, as of this date.)

Q. I'm going to hand you a document

that I've marked as Exhibit 548.

Have you ever seen Exhibit 548?

A. No.

Q. And Exhibit 548 was Exhibit 437 to Dr. Kurtz's or I'm not sure if it's Ms. Is a Getty's or Dr. Kurtz's deposition, but you don't recall seeing any discussion about Exhibit 548 in Dr. Kurtz's; correct?

A. I don't recall it; no.

(Exhibit 549, Newfields Carteret Forensic Microscopy Investigation bearing Bates Nos. USMR01074778-4797, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as Exhibit 549.

Do you recognize Exhibit 549?

A. No.

Q. You've never seen Exhibit 549 before?

A. No.

Q. This was also previously, you know, produced in connection with the presentation to the LSRP and has previously been marked as Exhibit 406 in prior

depositions, but it's your testimony you've never seen it before?

A. I've never looked at it. I will say that some things or so much paper flying around labeled Newfields, but I was not directed to look at them.

Q. Did you look at any of -- well, let me start back and set a foundation.

There are a number of Newfields PowerPoints that are included in your produced materials.

A. Yeah.

Q. Did you look at those?

A. No.

Q. Why not?

A. I wasn't directed to, I wasn't tasked.

Q. Okay.

So you haven't evaluated any of the analyses that are included in those Newfields presentations even though you had possession of them --

MR. GERMAN: Objection.

Q. -- correct?

MR. GERMAN: Objection.

A. That's true. Again, my preference is to evaluate them with the expert report. A PowerPoint in and of itself, particularly when I wasn't there to hear what was said, doesn't seem like a very smart way to evaluate something.

Q. But you're not really in a position to say that, are you, Dr. Flowers --

A. I absolutely am in a position -- if there's a PowerPoint and there's someone talking and I wasn't there, I don't know what was said about this or what it means. I would prefer to see an expert report that has -- that talks about this stuff.

Q. Do you -- if you're evaluating the importance of data, does it matter whether or not that data is presented on a piece of paper generated by PowerPoint or whether that data is presented on a piece of paper that was generated by Word?

MR. GERMAN: Objection to the form of the question. You can answer.

A. To answer the question, no, but this is a piece of intellectual property. I have no foundation to evaluate it with.

MR. SUTHERLAND: Objection, non responsive everything after no.

Q. Did you evaluate the Newfields documents that you were provided to determine whether or not they had any data that were relevant to the questions that you were asked to assess as part of your report?

A. No. But I may be called upon in the future to do that.

Q. Yeah, but you could have done that right after you got --

A. I could have done lots of things, but I didn't do this.

Q. Right.

A. Because I wasn't tasked.

Q. Okay. That's fine.

Did you review Dr. Mattingly's deposition in this case?

A. You'll have to identify him. They're all running together now.

Q. Steve Mattingly --

A. Who is he?

Q. Steve Mattingly with Newfields. He did the microscopy work.

A. I don't remember that one. I'll

just -- I just don't remember.
Q. Okay.
Did you review Dr. McVehil's deposition?
A. Yes, I did. I read it.
Q. Did you review a deposition by AJ Gravel? He's a historian.
A. I don't remember that one. I know the name, but I don't remember that one.
Q. Did you review a deposition by Dr. Rouhani? He's a Newfields geostatistician.
A. Again, I don't remember it.
Q. Did anybody assist you in the preparation of Exhibit 543, your report?
A. No.
Q. You wrote it all yourself?
A. I wrote it all myself. One stop shopping.
Q. If you could turn in your report, Exhibit 543, and go to page 1, and if you look at the first numbered -- the second numbered paragraph, the one that's numbered 2.
A. Again, the page?
Q. It's page 1, Summary of Opinions.

A. Okay.

Q. And under numbered paragraph 2, it's the middle sentence that begins contamination was transported.

Do you see that?

A. Yes.

Q. And the sentence reads: Contamination was transported into Carteret by wind as fugitive dust, particulate matter, and gaseous emissions, derived from the cupola and other furnaces, that cooled, condensed, and settled to the ground, blanketing the proposed Class Area.

A. Yes.

Q. Did I read that correctly?

A. Yes.

Q. And are you familiar with the term conceptual site model?

A. Yes.

Q. And as I understand it -- well, why don't you tell me what you understand conceptual site model to mean.

A. Conceptual site models are usually employed in remedial investigation to try to determine how contaminants may

have moved off site, the different pathways.

Q. And is it correct --

A. Where they might -- and where they might reside.

Q. And is it correct to say that your hypothesis or maybe even it's your opinion that's contained in your report is that the predominant conceptual site model for the USMR's facility for impacts within the proposed class area is described in this sentence that we just read?

MR. GERMAN: Objection to form. You can answer.

A. Essentially, yes.

Q. And so essentially, what you're saying is that the mechanism for the USMR smelter impacts was the deposition of airborne dust from fugitive and point source emissions?

A. I would say particulates.

Q. Okay.

And those particulates came from both fugitive sources and from point sources?

A. I would say they're a contribution of fugitive dust and stack emissions.

Q. There's a comment on page 10 of your report, it's the last sentence in the first paragraph under brief history of the Carteret smelter.

A. Okay.

Q. Tell me when you're there.

(Witness reviewing document.)

A. Where --

Q. And the last sentence of that paragraph reads: Not unlike smelters discussed above, it -- and then referring the USMR smelter -- closed in a period of increasing regulatory pressure to reduce air pollution beginning in 1955; specifically, it closed because of uncontrollable, ambient lead pollution in the air, with a citation to CH2MHILL.

Do you see that?

A. Yes.

Q. What -- other than the citation to CH2MHILL, is your conclusion that the smelter closed because of uncontrollable ambient lead pollution in the air, is there any other source that you're relying on for that conclusion?

A. There's a lawsuit of the State of New York versus USMR talking about lead, ambient lead over Staten Island, and usually it's not one thing that causes a smelter to close. It's a combination of economics and regulatory pressures that come up, and by 1986 it was too much for the smelter, and they decided to close it.

Q. And you're not rendering opinions with respect to how all those various economic and other factors combine to result in the closure of the smelter, are you?

A. No.

Q. And you understand that this the CH2MHILL was an adverse party in litigation against USMR at the time that this citation that you have in your report was created?

A. Yes.

Q. Have you done any evaluation of the ambient air testing that was done around the USMR facility in the mid to late '80s?

A. No.

Q. And so your opinion that we've been talking about here, or maybe it's not

even an opinion, but your notation in your report on page 10, you're not relying on any of the ambient air testing that was done; correct?

A. No. I'm looking at the soil data.

Q. Okay.

And just another sort of stray comment in your report I wanted to follow up on, if you turn to page 20, and it's in the middle of the page a sentence that starts sort of also in the midpoint of the line, some smelters were able to remain viable.

Do you see that?

A. Yes.

Q. Okay.

So the whole sentence reads: Some smelters were able to remain viable as long as commodity prices remained high enough; regulatory fines probably had little to do with their demise because they were effectively part of the operational overhead.

Did I read that correctly?

A. Yes.

Q. And the first part of that sentence is really going to the comment that

you made before, that there may have been economic factors that drove the closure of the smelter as well; right?

A. Coincident, perfect storm.

Q. But then the last part of that sentence, regulatory fines probably had little to do with their demise because they were effectively part of the operational overhead, did you do any evaluation of how the USMR facility accounted for any fines it may have had to pay?

A. I remember seeing a document which was a very strange document because it had a total of profits on one side and a total of fines on the other side, and as you would expect the fines were miniscule compared to the profits.

Q. Was that a USMR document?

A. I presume it was, but I couldn't -- there was nothing on the document that told me it was a USMR document.

Q. There's no citation to this sentence. Do you recall if that document was included in your references?

A. No, I didn't use it. I -- it's not telling me anything I didn't already know from other smelters, that they get fined a lot and they stay in business as long as the commodity business is high enough and the fines are not large enough to put them out of business.

Q. But you're not rendering an opinion with respect to how from an accounting standpoint USMR treated fines; correct?

A. Oh, no. I'm just saying there were fines and they were a cost of doing business and there are profits.

Q. And then there are costs associated with --

A. Sure.

Q. -- additional pollution control that may be necessary to comply with new air emission requirements; right?

A. Absolutely.

Q. And that may be an economic issue in this whole process?

A. Absolutely.

Q. Okay.

All right. And so what I want to do next is figure out what were the analytical tools that you used to make your determination that the USMR facility was the primary source of lead and arsenic within the proposed class area. So one of the things that you did is you looked at physical trends in the data; right?

A. (Witness nods head.)

MR. GERMAN: Yes.

A. Yes.

Q. And one of the things that you did is you looked at Spearman nonparametric correlation coefficients in the data; correct?

A. Yes.

Q. And you describe when you're talking about the Spearman analysis a sympathetic variation in the data; right?

A. Yes.

Q. And that's really another description of kind of what the Spearman analysis tells you?

A. Yes.

Q. Is it anything beyond that?

A. It tells me that to a high

degree of certainty that as copper goes up, lead and arsenic also go up in samples. It's not a hundred percent of the time, but it's a significant -- the majority of the time and that estimate has a high statistical significance.

Q. And when you use the term sympathetic variation from a quantitative standpoint, you're referring to the Spearman analysis; right?

A. Yes.

Q. Are you referring to anything else?

A. Just looking at the data, like in the table you'll notice of the plaintiff's data, I went through and I marked where I thought there was an elevation in copper and then I looked at whether or not the arsenic and the lead exceeded screening levels.

Q. So those were -- those were visual analyses --

A. Visual --

Q. -- against --

A. Yes. But they're captured in the Spearman analysis.

Q. So we've got these visual trends that we've talked about and we've got Spearman. Is there anything else that you used to determine that the USMR facility was the dominant source of lead and arsenic?

A. The statistics based on the USMR, the transects and samples taken by the plaintiff in the class area.

Q. And what do you mean by the statistics?

A. Statistics would be like the general descriptive statistics, the min, the max, the mean, standard deviation, the percentiles, number of exceedances for each heavy metal.

Q. And how does that distinguish between, say, for example, lead-based paint versus the USMR facility?

MR. GERMAN: Objection. You can answer.

THE WITNESS: Okay.

A. For example, lead-based paint has lead in it and it doesn't have copper in it to speak of and it doesn't have arsenic in it to speak of, so let's just take one

end member. Let's say that all the contamination in the class area is due to lead paint. Then you would see lead elevated everywhere and no copper and no arsenic. You see no relationship between copper content, arsenic content, lead content. You go on the other side, let's say the smelter just emitted copper. Then you would see no lead and no arsenic. But we know that the source emitted all three, and so the fact that they're highly correlated in soil samples is more likely than not an indication that one source with that signature is the source for contamination over the entire class area to a reasonable degree of scientific certainty.

Q. I understand what you're saying, Dr. Flowers, but I don't think that it really answers my question. The correlation between the elements is what's illustrated by the Spearman correlation coefficient; right? Correct?

A. Yes.

Q. My question really was: When you look at the tables, the max and the min

and the standard deviation, how do those particular statistics lead you to the -- or how do they support the conclusion that the USMR smelter is the dominant source?

A. Because they -- the averages decrease with distance away from the smelter. That's what you expect. If you go to the EPA, EPA says the major point of evidence for smelters being point sources is that decrease with distance away from the source, and they look at lead and soils and I -- I think it's a 1998 citation, and so you get a pattern. Now, it's not entirely clear that with lead paint you would get such a pattern over a wide geographic area. You get some houses maybe that might have a little lead paint, some others might have a little more, but there would be no pattern over a wide geographic area. Similarly, if a brake pad was dumped somewhere and somehow dissolved, there might be a copper anomaly around that brake pad, but it wouldn't be over a wide geographic area showing the pattern of decrease with distance away from the smelter.

Q. So it's your testimony,

Dr. Flowers, that one of the criteria you're looking at in terms of the patterns you're searching for is a decrease in the average concentrations with distance?

MR. GERMAN: Objection to form.

You can answer.

A. With distance from the smelter.

Q. Okay.

Well, let me have you look at Table 2.

A. Okay.

Q. And the average concentration of arsenic in Table 2 is 24; is that correct?

A. Yes.

Q. For the AOC. Is that right?

A. Yes.

Q. And then if we look at Table 5 on page 18, that also has an average arsenic concentration of 24 for outside of the AOC; right?

A. Yes. That doesn't bother me. It depends how big the plume is.

Q. But it doesn't show a decreasing concentration in arsenic, does it?

A. It depends -- you have a

footprint. It depends where you're sampling the footprint. If you're sampling pretty much on top of the biggest impact area, you're going to get similar numbers. They're not going to match up exactly decreasing with distance. There's var -- so much variability in this data that, you know, it's sometimes -- if you looked at the air bars, you might be up on top. In other words, the way I would interpret that is the transects are part of the AOC.

Q. Well, they're not, are they?

A. Well, that's according to you they're not, but to me they are.

Q. Okay.

If you look at page 14 of your report, in that first paragraph, you reference Figure 10 of your report, which is an evaluation of the copper with depth; right?

A. Yes.

Q. And --

A. In the AOC.

Q. In the AOC.

And you state in about the middle of that first paragraph on page 10:

It can be seen in Figure 10 that copper enrichment and exceedances occur in all depths as deep as 90 inches measured depth below the ground surface; correct?

A. That's what the data shows.

Q. And when we were talking about a conceptual site model, you indicated to me that the conceptual site model that you were using was an air deposition pathway; right?

MR. GERMAN: Objection to form.

A. Yes.

Q. And by definition, an air deposition pathway means that at least the initial deposition of the contaminant of concern would be on the surface; correct?

A. Yes.

Q. And then you would expect that the concentration, if indeed it came from the air, would be highest at the surface; right?

A. It depends when you look.

Q. Well, if you look at --

THE VIDEOGRAPHER: Doctor, where's your microphone?

THE WITNESS: Did I lose it?

THE VIDEOGRAPHER: You lost it.

THE WITNESS: I'm running around too much.

THE VIDEOGRAPHER: Just don't run it over. Okay?

THE WITNESS: Okay. I'm sorry.

THE VIDEOGRAPHER: Okay.

A. Okay.

Q. So if you look, say, the next day after the air emission occurs, it's going to be in the surface; correct?

A. Sure.

Q. If you look the next year after a lead emission, it's still going to be mostly concentrated in the surface; correct?

A. It depends.

Q. It depends on what?

A. Depends on what's going on at the site. I mean, it is -- generally what you say is true, that lead would tend to lag behind other contaminants, but it can be mobile.

Q. What conditions make lead mobile?

A. Generally high organics make it more mobile.

Q. Is that the only thing that makes it more mobile?

A. Digging it up and burying it might.

Q. Does it depend upon what the lead compound is?

A. Well, I wouldn't -- I never think of specific compounds in this case. This is more imparting a lead signature to a six-inch core sample.

Q. Well, for example, would lead oxide or would lead sulfite be more likely to move through a soil column?

A. Lead sulfite would weather and produce sulfuric acid and that would mobilize the lead more.

Q. Okay.

So it's your testimony that a lead sulfite would move more easily than a lead oxide?

A. Plus if there's SO2 coming in from the atmosphere because of the smelter, there would be acid rain falling, and that would enhance weathering at the surface.

Q. And so it's your testimony that

lead is more likely to move in soil if the soils are acidic?

A. Yes.

Q. Is it your opinion that the lead numbers that we see down to depths below three or four feet, that those originated from air deposition on the surface?

A. I can't tell.

Q. You don't know one way or the other?

A. No, I don't. I mean, they could be burial, they could be migration.

Q. What about lead concentrations between 12 and 18 inches? Is it your opinion that those predominantly came from air emissions?

A. Again, I don't know. I haven't investigated that.

Q. Have you investigated any other sites where they looked at aerial deposition of lead?

A. No.

Q. And so do you -- you don't know whether what other researchers have reported in terms of what the depth profile looks

like for an aerial deposition of a lead contaminant --

MR. GERMAN: Objection.

Q. -- do you?

MR. GERMAN: Objection to form.

A. In terms of the aerial extent of lead deposition, yes. As a function of depth, I don't think I've done a project looking at that. The only project that I've done looking at really depth as a factor in contaminant freight and transport is a contaminated bayou where they dredged it and the dredge spoil was put up on the bank and originally it contained zinc and chromium and lead, and pretty much in that environment anyway all the zinc and chromium leached out and the lead was left behind.

Q. So of all --

A. In that case.

Q. Of all the metals that were present in that case, lead was the least mobile; correct?

A. Right. But you have to remember that that was in a highly reducing environment contaminated with hydrocarbons and then it

was put up on a bank and was weathered, leached, oxidized, etc., and the end result was the lead content kept going up whereas the other contaminants disappeared.

Q. And are you aware that there are a number of documents from a regulatory standpoint where EPA generally characterizes lead as being largely immobile in soil?

A. That's not unreasonable.

Q. And if you look at Figure 19 of your report.

A. Sorry. Okay.

Q. If you look at Figure 19 of your report, some of the highest concentrations of lead are at depth; correct?

A. Yes.

Q. I mean, the highest numbers are in the 6 to 12 and the 12 to 18 inch soil intervals; correct?

A. Yes.

Q. And you have concentrations over 10,000 below 45 inches; correct?

A. Yes.

Can we take a break --

Q. Yes. Sure.

A. -- so I can get some water?

Q. Yes. That will help me find what I'm looking for, too.

A. Okay.

THE VIDEOGRAPHER: All right. We are going to go off the record at 11:10. We'll end media 2.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: Back on the record 11:15. This is media 3 in the deposition of Flowers.

(Exhibit 550, Figure 2 from Sullivan report, marked for identification, as of this date.)

CONTINUED BY MR. SUTHERLAND:

Q. Dr. Flowers, before the break, we were talking about the depth profile for lead samples and the concentrations at the various depth intervals. I'm going to hand you a document that I've marked as Exhibit 550, and this is a figure from Mr. Sullivan's report for plaintiffs in this case.

Do you recall ever seeing this

exhibit before?

A. Yes, I've seen this document.

Q. And it's a depth profile for the lead concentrations or the mean lead concentrations for the soil samples collected by Arcadis; correct?

A. That's what it says; yes.

Q. And what Mr. Sullivan has reported is that the two highest mean concentrations for lead concentration occur in the interval that's between 6 and 12 inches which is reported on this figure at 9 inches.

Do you see that?

A. Yes. He said the median, so. . .

Q. The median?

A. Yes.

Q. Okay.

So the median concentration is highest in that 6 to 12 inch interval; correct?

A. According to this graph, yeah.

Q. And the second highest median concentration is at the 12 to 18 inch interval; correct?

A. No, I don't -- maybe I'm missing something. I see it somewhere below 10.

Q. Well, if you look at the -- I'm not talking about the line, but the data points.

A. I'm looking at the data points.

Q. All right. If you look --

A. The second data point is up near 300.

Q. Right.

A. Which is above the 2 on either side.

Q. Right. And that's the 6 to 12 inch interval; right?

A. Oh, that's what you're calling 6 to 12.

Q. Yeah. I mean, it reports out at 9, which is halfway --

A. Okay.

Q. -- between 6 and 12.

A. Okay. Okay. Yes. That's okay.

Q. And then the second highest reports out at 15, which is the 12 to 18 inch interval; correct?

A. Right.

Q. And so what Mr. Sullivan's figure is showing us is that there's actually greater concentrations, at least according to the median, at those two lower intervals; right?

A. Yeah. 50% of the values are above, 50% are below what's plotted.

Q. And is it your opinion to a reasonable degree of scientific certainty that that particular depth profile is consistent with an air deposition pathway of lead?

MR. GERMAN: Objection to form and foundation.

You can answer.

A. Well, I guess my answer is a little more complicated than your question. Material in the class area, and this happens with all smelters, isn't necessarily pristinely left where it settles from the air. People dig it up, they move it around, they truck it through the neighborhood, they fill in stuff, and like that. The AOC in particular, there are aerial photos that show it completely denuded of vegetation, so

I don't know, you know, you could have air deposition and then plow it under as a possibility.

Q. Dr. Flowers, can you point me to any document or other evidence that plowing under, as you describe it, accounts for the data that we see on Exhibit 550?

A. Again, he's using the median, 50% above, 50% below. I'd prefer to look at the whole distribution.

MR. SUTHERLAND: Objection. non responsive.

Q. Can you point me to any particular document or other evidence that supports your statement that plowing under explains the data that we can see in Exhibit 550?

A. No.

MR. GERMAN: Objection. Asked and answered.

A. I can't.

Q. And you haven't done that analysis as part of your report; correct?

MR. GERMAN: Objection.

A. Not yet. No.

Q. And you say not yet. Are you planning to do it?

A. If I'm asked to do it, I will.

Q. And you haven't been asked so far?

A. Not so far. But I don't, you know, think that you can rule out the possibility of burial of airborne deposition.

Q. Okay. I mean, fair enough, you can't rule it out, but you, at this point in time, you can't say whether that happened or it didn't happen; right?

A. I can say that in an aerial photo of the AOC area, it's completely denuded of vegetation and it looks like there was some heavy equipment working across the surface, but I don't know what they were doing, whether they were digging or whatever, like that.

Q. What aerial photo are you referring to?

A. It's in the --

Q. Is that cited in your report?

A. It's in the '40s. No. I'm just recalling it from the memory. I just don't think you can be categorical about what went

on in the --

Q. Whether a particular property had significant disturbances of soil like the type that you have described, that would be something that would happen that would be unique to that particular property; right?

A. I don't know.

Q. You don't know?

A. No.

Q. Well, you wouldn't expect there to be reworking of the whole proposed class area in a uniform way, would you?

MR. GERMAN: Objection.

A. Not in a uniform way, but there could be erosion, there could be transport, there could be hauling, there could be dust, there could be -- there are all kinds of possibilities. This is what I've seen in other smelter areas. Primary mode of transport was their deposition, but then it was rearranged.

Q. In that second rearrangement, where and how that happened, that would vary across the class area; right?

A. Different mechanisms could be

operating, but I don't know specifics here.

Q. I direct your attention to page 26 of your report, and if you look at that first paragraph under other sources, the last two sentences, maybe the last three, but the last two sentences say: The solubility of heavy metals is limited under neutral to mildly alkaline conditions in the soil.

Do you see that?

A. Yes.

Q. And then you go on to say: Highly acidic soils are found in New Jersey when metal sulfides weather and generate sulfuric acid that enhances the solubility of buried metal. New Jersey has produced maps showing the occurrence of acidic soils, and soils in the Carteret area have a low potential for acidity.

Did I read that correctly?

A. Yes.

Q. And so it's your opinion that at least with respect to acidity promoting the movement of lead within the soil column, that's a low probability in Carteret; correct?

A. Well, the map that is produced

here is talking about indigenous sulfides, and it doesn't treat things like sulfur dioxide coming off of a smelter, acid rain being produced in the vicinity of a smelter, sulfides being spread across the ground, weathering producing sulfuric acid, all those things could mobilize metals and cause them to sink deep into the ground.

Q. Did you do any evaluation of the sulfur content of soils in Carteret?

A. Sulfur content in and of itself would not help you. What you need -- would need is measurements of pH.

Q. Did you do any evaluation of the pH of the soils in Carteret?

A. No. I looked at the soil map to see if there was any indigenous acidic soils, and there weren't, and then everything else would have been in the past.

Q. And another parameter that would be important to that evaluation would be the buffering capacity of the soil, too; correct?

A. Right.

Q. And did you do any evaluation of the buffering capacity?

A. No; but I know what the soils are and the soils are -- have limited buffering capacity.

Q. And what kind of soils are those?

A. Well, you know, you have triacic soils there, there's sand, silts, clays, you don't have any limestone. Limestone would have a high buffering and neutralization capacity. The diabase doesn't have a high buffering capacity. What you -- what I think you're getting at is something that would neutralize the acid. There's not a lot in the Carteret area that would neutralize acid. So I would think acid rain would be a common occurrence around a smelter that was smelting green sulfite concentration.

Q. But you haven't done any pH analysis?

A. No, I haven't.

Q. And you could have requested that particular analysis as part of plaintiff's soils in this case; correct?

A. Right. But I can generally predict what the answer would be.

Q. You can't --

A. Based on the rock type.

Q. You can't say?

A. I can't tell you the exact number, but I can tell you whether it's alkaline or acid.

Q. And so do you have an opinion to a reasonable degree of scientific certainty as to the pH of the soils that are present in the borough, Carteret?

A. Right now? No.

Q. Because you don't have the data; right?

A. No, I don't. But I know what the rocks are and I know what buffering capacity is and I know what acid rain is and, you know, acid rain is a problem in areas underlain by granitic rocks because they have no buffering capacity where acid rain is less of a problem in areas underlain by limestone.

Q. Well, Dr. Flowers, I mean, directing you back to page 26 of your report where other sources of potential contaminants including metal scraps, you dismissed those potentials because the

Carteret area soils have a low potential for acidity; right?

A. Yes.

Q. And so you're changing your mind?

A. No. I'm saying that the acidity wasn't constant, it changed, it varied, depended on which way the wind blew, depended on whether or not it rained.

Q. So that's something that we would have to evaluate on a property by property basis?

A. No.

Q. Well, I --

A. You wouldn't --

Q. I don't -- don't understand your answer then.

A. Well, my answer is this is a larger meterological phenomenon and a smelter phenomenon, it's not an individual property phenomenon.

Q. Well, then you also go on and you say on page 26 that it's not a phenomenon that is important with respect to other sources because the soils are generally not acidic; right?

A. That's what you would expect absent of anthropogenic effects.

Q. So you're changing your mind and you're saying --

A. No, I'm not.

Q. No?

A. Your question was what I wrote and I'm explaining what I wrote and why I wrote it and that would say that generally you wouldn't expect a brake pad to dissolve and move over the entire class area, you wouldn't expect type face to dissolve and move over the entire class area, but you would expect emissions from a smelter to come through the air and be deposited in the entire class area.

Q. What you actually said on page 26, the last section, is: Soils in the Carteret area have a low potential for acidity. That's what you said; right?

A. According to the State of New Jersey.

Q. Well, this is according to you.

A. No, I am looking -- I am citing a reference there that takes the big picture

view of soils in New Jersey.

Q. How -- what does the pH have to be to solubilize lead?

A. 2 maybe.

Q. What's a typical acidic soil pH?

A. Less than 4.

Q. pH is a long scale; right?

A. Sure.

Q. So the difference between a pH of 2 and a pH of 4 is a thousand; right?

A. No. It's a hundred.

Q. Or a hundred. Okay. It's a factor of a hundred.

A. Yeah.

Q. And so even if we have acidic soils, the pH is still a hundred times too high to solubilize lead?

A. In a broad geographic sense.

Q. Okay.

A. But it doesn't preclude the possibility that one day some particularly noxious stuff came out of the smelter that was full of acid and blew across the ground and then it rained and sulfuric acid fell from the sky.

Q. And it's your testimony to a reasonable degree of scientific certainty that the scenario that you just described explains the data that we see in Exhibit 5 --

A. No, it does not.

Q. It does not?

A. Does not.

Q. Because you haven't done the work?

MR. GERMAN: Objection.

A. No, I haven't investigated that.

Q. What's more likely to move through the soil column? A particle that originated from a pyrological process like a smelter or a chip of lead-based paint?

MR. GERMAN: Objection to form, foundation.

A. It depends on the particle.

Q. What parameters of the particle --

A. Well --

Q. -- influence that?

A. -- you might have little bitty bitty submicron particles that could pipe their way down, not go into solution, but be carried down simply physically by infiltrating

groundwater.

Q. How small would it have to be to do that?

A. It depends on what the porosity and the size of the pores are. I don't know what that is.

Q. That would be less likely to happen in a clay soil; correct?

A. In a clay, probably so, unless there were fractures.

Q. And do you know whether or not Carteret typically has clay soils?

A. The exact texture of soils varies, but they didn't look like pure clay to me.

Q. Well, they're not sandy, are they?

A. No, they're not sandy.

Q. What other things would influence whether a paint particle or a smelter particle is more likely to move to deeper depths?

A. One would be whether or not the particle density, the -- whether or not the particle is reactive with other particles.

Q. Would lead paint or lead in a smelter particle tend to be more reactive to

the environment?

A. I would think the smelter particle would be reactive. Lead paint is low density, unless it was ground up really fine, it might infiltrate. Again, it just depends on the specifics.

Q. What about the comparison between a smelter derived particle with lead and a pure solder ball?

A. A pure what?

Q. Solder, you know, the combination of lead and tin that makes up solder.

A. Yeah.

Q. Which is more likely to react in the environment?

A. Well, the smelter particle I would expect to be much smaller than the solder ball on the micron scale.

Q. Well, what about solder balls that are created by the -- when you're sweating the pipe, you vaporize small amounts of the lead and they coalesce small balls? Do you know what the micron size of those are?

A. I don't -- I think they're pretty -- if you can see them, they're big.

Q. Well, let me direct your attention to this one, Exhibit 549.

A. Do I have that one?

Q. Yes.

A. It says 545. Oh, that's a 9. I'm sorry.

Q. And if you could turn to it's Bates USMR01074793.

A. Okay.

Q. And this is a PowerPoint of a sample that was collected in the 0-6 inch layer at 148 Carteret Avenue.

A. Okay.

Q. Do you see that?

A. Yeah.

Q. And as part of that sample, the microscopy identified some very small solder balls.

Do you see that?

A. I see them.

Q. In your opinion, would those solder balls be more likely or less likely to be reactive such that they move deeper in

the soil column than smelter material?

A. I can't tell how big they are from -- just because it's 100X, I don't -- I can't see the scale bar.

Q. Okay.

Well, if -- assuming that they're less than 20 microns, if they're less than 20 microns, would you expect them to be more reactive or smelter material to be more reactive?

A. I don't know.

Q. You don't know?

A. (Witness shakes head.)

Q. Generally, smaller particles have larger surface area, correct, per mass?

A. Per mass?

Q. Yeah.

A. Yeah. They -- generally the smaller the particle, the greater the surface area.

Q. And that is --

A. But it depends what the particle is.

Q. Right. I mean, if it has porosity, that may or may not be true, I

guess; correct?

A. Sure.

Q. But as a general matter, the greater the surface area, the more potential that the material has to react in the soil environment?

A. Potential; yes.

Q. And is it also true that some types of particles, particularly vitrified particles, are less reactive because of their physical structure?

A. They can be less reactive; yeah.

Q. And the pyrological emissions from a facility like a smelter will tend to be a vitrified particle; right?

A. It depends on the rate of cooling and the composition. I can't make a blanket statement. They're generally spherulitic, but they could be partially crystallized, partially glass.

Q. But frequently they are -- they're vitrified to at least some extent; correct?

A. I would say that it's not uncommon to find glass in them.

Q. Have you found an evaluation in this case to determine whether or not the particles that emanated from the USMR smelter were vitrified or not?
A. No. There's no samples that exist.
Q. Have you done any evaluation to, looking at the soil samples, to determine whether or not there are vitrified spheru -- I can't say it -- spherulitic, how do you say it?
A. Spherulitic.
Q. Spherulitic particles present?
A. No, I haven't.
Q. You've done that in other cases; right?
A. Yes.
Q. I mean, for example, we were talking about that case in Pennsylvania, the coal burning power plant.
A. Shipping Port; yes.
Q. One of the things you did is you looked at the wipe samples and soil samples and identified each of the particles; right?
A. Right.

Q. But you didn't do that here?

A. No. I didn't need to do that here.

Q. Turn back to your report again, page 16.

In this paragraph, you describe that -- the transwidth distance that we talked about briefly earlier this morning that you saw in the soil data; correct?

A. Yes.

Q. And you reference figures -- I think Figure 12 is the figure that describes copper, Figure 15 is the one for arsenic and Figure 20 is the one for lead.

A. Okay.

Q. Is that right?

A. Yeah.

Q. All right. Well, let's look at arsenic first, so let's go and look at Figure 15. I think it's -- yeah, Figure 15B.

A. Yes.

Q. And it's your testimony to a reasonable degree of scientific certainty that Figure 15B shows a downward trend in the arsenic concentration; correct?

A. Yes.
Q. And that's based upon your visual observation of this data, it tells you that the trend is going downwards?
A. Yes.
Q. Do you understand, Dr. Flowers, that there's general agreement I think among the experts that there is a downward trend in the data within the AOC? Do you understand that?
A. Yes.
Q. But it's your opinion that that downward trend continues into the AOC and continues into the area where the plaintiff took samples; correct?
A. Right. My opinion is that the AOC is too small.
Q. Well, and I'm not asking about remediation or anything else like that. I'm just focusing in on your opinion about the trend.
A. Okay.
Q. And as I understand, where the difference occurs between what the defendants' experts are saying and what

you're saying is the defendants' experts are saying, you know, there's no longer a trend with distance, once you get outside of the AOC, you're probably -- or even shortly before, even before you get to the boundary, shortly before the boundary in the AOC, but what you're saying is no, that trend continues even outside of the AOC; right?

A. Yes. And the reason I say that is that, you know, a smelter plume, you can use the mathematical function and draw it and take a cross-section through it and it will decrease with distance in a regular way. In reality, things don't happen that way. I think slopes from the AOC to the transects are completely unreliable, changes in slope as a demarcation, that's a completely unreliable practice because the materials in a smelter plume are subject to natural forces, it's not a mathematical function, and although they may show that general trend, the trend's not going to be necessarily perfect.

Q. Dr. Flowers, you told me this morning you're not an air modeling expert;

right?

A. I'm not an air modeling expert, but I can look at contours on a plume and tell you that there are certain directions you can cut through that plume with where the emissions just remain constant.

Q. And you're not an expert on meteorology either, are you?

MR. GERMAN: Objection.

A. I teach weather and climate. I'm not a weather forecaster.

Q. So you're not really -- you're not really -- you don't have the expertise to render an opinion on how the dispersion of air contaminants occurs within the Carteret proposed class area, are you?

MR. GERMAN: Objection.

A. I would say that it has nothing to do with meteorology or air modeling or anything, it's based on the soil data and the fact that a plume in a natural setting does not necessarily conform to rigid expectations. There can be highs that are displaced from the source, for example. We see that in volcanic eruptions all the time.

It depends on what's going on in nature as this stuff is dispersed out into the atmosphere.

Q. Have you done any quantitative or even semi-quantitative analyses that would suggest that there are hot spots or higher concentration as a result of historical air emissions that are far away from the USMR smelter?

A. Well, if you -- I can only look at the data that we have, and if you look at all the different distance plots, you'll find some where all three metals jump up off trend. Trend has a lot of variation in it. That's why they have to be plotted in logged space. So the fact that you find a high value away from a smelter doesn't surprise me at all.

Q. Well, another explanation for the high value away from the smelter is that it came from another source; right?

A. If it's got all three metals in it, it's hard to embrace that alternate source theory.

Q. The answer to my question though

is if another explanation -- assuming that the source or multiple sources contain those metals, another explanation is it came from those alternate sources?

MR. GERMAN: Objection.

A. Not necessarily.

Q. So that's not possible?

A. I'll tell you what's not possible, is to have --

Q. Can you answer my question?

MR. GERMAN: Allow him to.

A. I'm trying to.

Is to have a confluence of multiple sources come together in the right place and give the pattern that we see in this plume. That's a very low probability occurrence. So you need to deliver to a specific site from an alternate source, you need to deliver copper, you need to deliver arsenic, you need to deliver, more often than not, lead in the relative abundance that we observe on average in the plume, and with alternate sources, that's -- so it's low probability that that would occur over the entire class area that I rejected that

hypothesis.

Q. Okay. All right.

So it's your testimony to a reasonable degree of scientific certainty that where we have one of these properties that's anomalous in terms of jumping up, as you explained it, based upon your analysis, you cannot explain those with some combination of alternate sources, and that's true for every single one of those properties?

MR. GERMAN: Objection. You can answer.

A. Again, I did not look at it as a parcel by parcel analysis.

Q. You didn't do any specific parcel analysis --

A. No.

Q. -- did you?

A. No.

Q. And you didn't do any evaluation of, you know, the various parameters that you can use to characterize individual properties such as the boring logs and other things that are available from the field notes that give you indications as to the

history of that property; right?

MR. GERMAN: Objection.

A. No, I didn't need to.

(Exhibit 551, Figure 15 from Dr. Flowers' report, marked for identification, as of this date.)

Q. I hand you what I've marked as Exhibit 551. This is -- what I did is I took your Figure 15, Dr. Flowers, and all I did was I blew it up so it's a little bit easier to see and then I blanked out the blue data, so all of the AOC samples are removed.

Do you see that?

A. Yes.

Q. And is it your testimony to a reasonable degree of scientific certainty that with respect to the remaining red data that we can see on this Exhibit 551 there's a downward trend in that data?

A. Yes.

Q. Okay.

You can see that trend?

A. I can see it.

MR. GERMAN: I just want to

object to your characterization of what you've done to the exhibit. Dr. Flowers could testify whether it matters or not, but not all -- it appears to me not all of the red data remains in Exhibit 551 and some of the blue data remains in Exhibit 551.

Q. Do you have enough information and did you understand my question with respect to whether or not there's a downward trend in the red data?

A. Yes.

Q. And then you see the -- that sort of green oval that's put around that data that's about .9 mile distance?

A. Yes.

Q. Do you know whether all of that data is for the same property or not?

A. No, I don't.

Q. You didn't do any individual analyses?

A. No, I didn't.

Q. And so you don't know what the particular history is, if indeed that is one property, what the history of that property

is; right?

A. No, I don't.

Q. Were you using that particular set of data in your evaluation of whether or not there's a downward trend here?

A. Yes. I would consider those outliers to the trend.

Q. So the trend exists notwithstanding -- even if you take those data points out?

A. Yeah.

Q. And I want to direct your attention to Figure 20B, and Figure 20B is your trend plot for lead; correct?

A. Yes.

Q. And you've indicated in your report that you can observe a downward trend in that data, too; correct?

A. Yes.

Q. And it's your opinion that that downward trend extends into the samples that are colored red on the figure; correct?

A. Yes.

(Exhibit 552, Figure 20B, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as Exhibit 552.
A. You're going to --
Q. Yes. That one.
A. Okay.
Q. And I've done something similar here, I've taken out the blue data, which is the data within the AOC, and then I've drawn a green box around the data from approximately .6 miles to 1 mile and then I've drawn a red box around the data from approximately 1 mile to 1.6 miles.
Do you see that?
A. Yes.
Q. Do you know what the difference in housing age is between the properties contained in the green box versus the properties contained in the red box?
A. Not specifically.
Q. Would you be surprised to know that the median -- the difference in the median of those houses is over 30 years?
A. Which way?
Q. The houses in the red box are 30 years newer than the houses in the green box.

A. That would be consistent with the development of Carteret.

Q. And are you also aware that it has been repeatedly demonstrated in the scientific literature that lead soil concentrations are heavily correlated to the age of the house?

MR. GERMAN: Objection. You can answer.

A. Particularly if they were built after the ban on lead paint occurred.

Q. So is it your testimony that there is no difference in the impact on soil lead from houses between, say, 1920 and houses from 1950?

MR. GERMAN: Objection. You can answer.

A. I think lead paint was still being used in 1950.

Q. So you would expect that the lead concentrations for houses built in 1950 to have similar lead concentrations to those built in 1920?

MR. GERMAN: Objection. You may answer.

A. I don't know. It depends what kind of paint was used.

Q. You haven't done that kind of evaluation?

A. No, I haven't done that.

Q. And as far as you know, you cannot make a general determination with respect to the potential for lead-based paint to impact soil concentrations based upon the difference between a house built in 1920 versus one built in 1950; is that right?

MR. GERMAN: Objection. You can answer.

A. No, I can't.

Q. You would agree with me that Figure 20 does not control for housing age; right?

A. No, it doesn't.

(Exhibit 553, Distributions of Soil Lead in the Nation's Housing Stock May 1996, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as Exhibit 553. Have you ever seen that document before, Dr. Flowers?

A. No.
Q. Exhibit 553 is entitled Distributions of Soil Lead in the Nation's Housing Stock; correct?
A. Yes.
Q. And it's a U.S. Environmental Protection Agency document dated May 1996; correct?
A. Yes.
Q. And I'll direct your attention to the Executive Summary, and for the record it's not the entire document, just I didn't want to kill too many trees. The Executive Summary, the first sentence states: The primary objective of this study was to supplement the prior reports on the national survey of lead-based paint and housing through additional data analyses specifically focusing on the relationship between lead and exterior soil, a potential source of lead hazard in homes with housing unit characteristics.
Do you see that?
A. Yes.
Q. And then if you flip over to the

next page under Private Housing, the first sentence states: The strongest statistical predictor soil lead was found to be the building age.

Do you see that?

A. Yes.

Q. And then the second -- skipping one sentence, the next sentence reads: For private housing units, soil lead around homes built before 1940 were significantly greater than lead in soil around homes built between 1960 and 1979; correct?

A. Right.

Q. And that would suggest that the potential for lead impacts on properties within, going back to Exhibit 552, if I'm correct, is much higher in the green box than it is in the red box; right?

MR. GERMAN: Objection. Form, foundation.

A. There is a complication here in the fact that this study presumably was not in the presence of a copper smelter.

Q. Well, I understand that, but in terms of the potential for impact from lead-

based paint, if we're just focusing on that factor as a potential source of lead, what Exhibit 553 tells you is that that potential is much greater for the properties in the green box than it is for the properties in the red box?

MR. GERMAN: Objection.

A. I don't think that's what it tells you.

Q. Why not?

A. Because there's no smelter present here.

Q. I'm just asking about the potential for lead-based paint. I'm not asking about the smelter.

A. Regardless of what you're asking, there is a smelter here.

Q. You can't answer my question --

A. No, I can't.

Q. You can't?

A. No. Not with the smelter present.

Q. Okay.

A. No.

Q. Fair enough.

You can't tell me whether or not

the potential for lead-based paint impacts is greater in housing built in 1920 versus housing built in 1950, that's something that you can't tell me?

A. If you --

MR. GERMAN: Objection.

A. -- asked me the question in New Orleans, I can answer the question.

Q. All right. What's the answer in New Orleans?

A. In New Orleans, the older houses have a greater potential for lead-based paint in soil.

Q. And that same conclusion cannot be applied in Carteret, is that what you're telling me?

A. Not in the presence of a smelter.

Q. Okay.

Did you do -- for Figures 12, 19 and 20, did you do any sort of best fit calculation?

A. No, I didn't.

Q. And I think you --

A. I considered --

Q. Go ahead.

A. I considered that a vacuous enterprise.

Q. And you felt like that your own visual interpretation of the data was more accurate than a best fit line?

MR. GERMAN: Objection. You can answer.

A. I considered that there's so much scatter in the data that the quality of the fit would be dubious, and so I used a visual examination.

Q. And in your mind, a visual examination under those circumstances is more reliable than a best fit line?

A. With this data, yes.

Q. And I think you told me before, you didn't run a Mann-Kendall test; correct?

A. No.

Q. Did you do any kind of variogram analysis?

A. No, I didn't. You would have to have -- variograms are for this type, referring to Exhibit 21, generally are used with kriging where you're contouring, where you're trying to interpolate between data

points.

Q. That's your testimony, the only use of a variogram is --

A. No. But that's generally where it comes into play.

Q. Aren't variograms frequently used to determine whether there's any directionality in the data?

A. That's what a contour map tells you also.

Q. Well, isn't that what you're trying to determine with Figures 12, 15 and 20, that there's a direction in the data that it decreases; right?

A. No. This is just distance, any compass distance.

Q. But the conclusion that you drew from Figures 12, 15 and 20 was that the concentrations were decreasing with distance?

MR. GERMAN: Objection to form.

A. The distance in varying directions. Kriging and variograms are used to predict in geographic directions like to the north, to the south, to the west. These diagrams are simply as the crow flies, how

far is the sample from the smelter in all directions geographically.

Q. Well, wouldn't you expect that if your conceptual site model is correct, that you would have a decreasing trend in concentration along a particular transect?

MR. GERMAN: Objection. You can answer.

A. You may or may not. It depends where the transect is located.

Q. Well, if the transect origin is at the USMR facility and it projects outward in a consistent ordinal direction, wouldn't you expect to have a decreasing trend?

A. Not necessarily.

Q. What's your basis for that statement?

A. Well, I mean, it wouldn't be necessarily strictly decreasing. It would be high near the smelter and it would decrease, but it could keep going at a very low level for a long distance. It depends how big the plume is.

Q. Well, wouldn't you expect a directional variogram to identify that trend?

A. It might if you had complete sampling of the plume.

Q. But you didn't do that?

A. There aren't the samples.

Q. There's not enough soil samples --

A. No.

Q. -- to make that determination?

A. No. Absolutely not.

Q. How many samples do you need?

A. Well, first you need a geographic distribution, if you want the whole plume.

Q. I don't want the whole plume. I want to know if there's directionality within the geographic area that we have sample from. How many samples within that 1.6 miles or so that we have samples, how many samples do I need to run a variogram?

A. I don't know what -- I haven't done it, so I can't answer that question.

Q. Well, you said you didn't have enough samples. On what basis --

A. No. What I --

Q. -- did you determine that?

MR. GERMAN: Objection.
A. No. That is not correct.
MR. GERMAN: Objection to form.
A. What I said is if we're looking at the entire plume, we don't have enough samples.
Q. Okay. Well, let me ask the question this way. Do we have enough samples on any one of the three transects that all of the people have been looking at as far as the data goes to do a directional variogram along that transect?
MR. GERMAN: Objection. You can answer.
A. With respect to discerning the general trend of a decrease of distance, we have enough samples.
Q. But you didn't do that?
MR. GERMAN: Objection.
A. Not with a variogram.
Q. All you did was look at the data?
MR. GERMAN: Objection.
A. I looked at the data.
Q. Okay.
A. But the data trumps potentially

the variogram.

Q. Well, the variogram evaluates the data, too; right?

A. Of course.

Q. And so what you're saying is that your visual interpretation trumps the variogram?

MR. GERMAN: Objection.

A. No. I have to see the variogram. I haven't seen any of this stuff. I don't know what you're talking about.

Q. All right. Well --

A. What specifically was done?

Q. Let me direct your attention to Exhibit 547. This is the Geosyntec presentation.

A. Again, I have not reviewed this.

Q. But you have reviewed the Newfields PowerPoint.

A. No, I haven't.

Q. You haven't?

A. No.

Q. You do have them. They are in your reference materials.

A. I know, but I've told you already I haven't reviewed them.
Q. Okay.
And if you look starting on Bates USMR01074703 --
A. Yes.
Q. -- there's some variograms for the AOC data.
Do you see that?
A. Yes.
Q. So within the AOC they run variograms and the first one is for copper and it actually shows based upon the variogram that there is a trend with distance within the AOC.
Do you see that?
MR. GERMAN: Objection. You can answer.
A. Okay. Distance feet. What is the units on the X axis?
Q. I think it's feet times 10 to the third.
A. And feet is increasing to the right?
Q. Increasing to the right.

A. From the smelter?

Q. Yes.

A. Well, this shows the opposite pattern. It shows it low by the smelter and getting higher away from the smelter, if I'm interpreting correctly.

Q. Have you used variograms in your work before, Dr. Flowers?

A. I used -- there is a variogram underneath this, but I used the defaults. I didn't mess with it for this contour map on Figure 21.

Q. Okay.

A. Because the variogram tells it how the variable varies with geographic distance.

Q. Right. And I don't -- I don't think the Y axis is concentrations on Bates 1074703.

A. Maybe it isn't.

Q. I think it's a statistical parameter.

A. Yeah.

Q. And as I understand it, an increasing line on a variogram indicates

directionality in the data.
A. Okay. So what this is saying, according to you, is that there's more directionality further away from the smelter?
Q. No. It just -- I think a constant slope or a slope of this type just means directionality, period. I'm not certain that it does.
A. I think there is directionality in the data. I'm not --
Q. Within the AOC?
A. I'm thinking the whole class area.
Q. Well, I guess what I'd like to point out to you is that if you compare the AOC copper variogram, which is on Bates 703 --
A. Right.
Q. -- to the directional variograms for copper on the transects, which is at 711 --
A. Okay.
Q. -- and they're kind of small, so they're a little hard to see, you see what I've referred -- what's been explained to me are what's called hole-effects.

A. Yes.

Q. Which means it's a random distribution.

MR. GERMAN: Objection.

A. Yeah, but I see no problem with that at distance away from the smelter.

Q. So you don't -- you would not expect once you get into the transects to be able to see a trend with distance on the variograms; is that right?

MR. GERMAN: Objection.

A. What I'm saying is that as you move away from the smelter, the signal degrades. The signal is strongest right near the smelter and it degrades away from the smelter, and then as you go really far away from the smelter, the signal drops below background.

Q. And so is it your testimony then that at least using variograms as a tool, that you would not be able to see what you refer to as the decreasing concentrations with distance once you get outside of the AOC?

MR. GERMAN: Objection.

A. No. That's not my testimony. You still see a decrease along the western edge --

Q. But do you --

A. -- of the class area.

Q. But do you --

A. It's less than near the smelter.

Q. That's true with -- that's your testimony that that's true with respect to arsenic?

A. Sure. It decreases. It doesn't decrease as much as, say, copper, but it -- they still decrease. Lead is lower, the number of exceedances are lower. Copper is the one that sticks around.

Q. Well, I mean, we talked about --

A. I mean arsenic. Arsenic is the one that sticks around.

Q. Well, I mean, we talked about it earlier today that we looked at the AOC and we looked at outside the AOC and the average concentration of arsenic was the same, it was 24 ppm per --

MR. GERMAN: Objection. You can answer.

A. Yes. But I think they're up on top, you're up in the major impact zone of the smelter.

Q. I don't understand your answer.

A. Well, okay. Think of it this way. This is the smelter. Here's the impact. It's way, way up here. It's bobbing around because there's variability. And then it starts to fall off at some rate and then it comes off end into the tail and the tail just keeps going.

Q. That's your --

A. It doesn't go to zero.

Q. That's your testimony as to the shape of the impact that you would expect from the smelter?

A. Sure.

Q. And --

A. I would not expect it to go to zero.

Q. And it's your testimony that what you just described in terms of the shape of the K-curve that the AOC arsenic, average concentration of 24 ppm, that makes sense compared to the further out average

arsenic concentration of 24 ppm in the transects in the plaintiff's samples?

MR. GERMAN: Objection.

A. Well --

Q. Is that right?

A. Particularly when you consider all three metals.

Q. All right.

A. And, in fact, they're correlated.

Q. Okay.

Now, looking at -- and I'm not sure if I did this with your new report, so let me make certain. Looking at Figure 16 where you've got your contour map for arsenic.

A. Yes.

Q. You did not evaluate any of the transects in plaintiff's data in connection with that figure; right?

A. No.

Q. And the same thing is true with respect to Figure 21 for lead; correct?

A. Anything for the AOC is just the AOC.

Q. And so both Figure 16 and 21 don't tell us anything with respect to what

contours we might expect out in the transects of the plaintiffs' sample area; correct?

A. No, they do not tell you anything.

Q. On Figure 16, you identified a linear feature that's just northeast of the parking lot.

A. Yes.

Q. Did you do any evaluation of those particular samples that are within that linear feature?

A. There's a table in the report that summarizes -- I selected them by intersecting a polygon with the data which is a point layer with a polygon that I made around this feature, and then somewhere in the set of tables there's a set of summary statistics.

Q. Is it your testimony that the impacts that you can -- are associated with that linear feature that we can see in Figure 16 are as a result of aerial deposition of particulate from the USMR facility?

A. I don't know what they're from.

Q. So in that particular case, you

don't know what the --

A. I think they would be impacted by aerial deposition. It would be -- they look like a ditch.

Q. Do you know whether or not those particular samples in that linear feature were impacted by the placement of non-native fill material?

MR. GERMAN: Objection. You can answer.

A. Not with the -- if you look at the statistics on Table 4, page 16, the maximum copper is 19,000, the average is 3,750, and then when you go to lead, it's 21,000 is the max and the min -- the average is 3,436, and then arsenic, 605 is the max and 135 is the average. These are some of the highest values observed in the AOC.

MR. SUTHERLAND: Objection. non responsive.

Q. My question was: Do you know whether or not the samples that were collected from this area, whether they were as a result of air deposition or whether they're as a result of non-native fill

material?

A. They are not native fill material, I guarantee you.

Q. I said non-native fill material.

A. Non-native. That's what I'm --

Q. You're guaranteeing me they are not --

A. I'm guaranteeing you they are not. They are not paint chips, they are not leaded gasoline, they are not pesticides. They are connected to that smelter.

Q. Could they be slag?

A. Sure, they could be any kind of material, but they're always being impacted by air fall. They're right next to the smelter.

Q. Well, I mean, my -- I guess maybe I wasn't clear with my question, Dr. Flowers, but I'm including within non-native materials things like slags and other sort of waste materials like, you know --

A. From where?

Q. From anywhere.

A. No. These are slags from the

site, from the USMR site if they're in there.

Q. And so how do you know that?

A. Because they're enriched in copper, arsenic and lead --

Q. Is it your --

A. -- to an extreme degree.

Q. Is it your testimony, Dr. Flowers -- or let me ask this another way.

What evaluation have you done of other industrial sources located in the immediate vicinity to the USMR facility that generated solid waste materials that may have been used as fill that contained arsenic, copper and lead?

A. I haven't done that.

Q. And so you can't say as you sit here today whether or not, assuming that these are non-native waste materials that were put there, you can't say whether they came from the USMR facility or some other industrial facility in the immediate vicinity, can you?

A. It is my opinion that they came from the USMR facility, and I can say that. You have a feature that is emanating from

the site, the most logical, greater preponderance of evidence, if you will, and its signature geochemically says it's from the site.

Q. What do you mean by its signature geochemically?

A. What I read from you in Table 4. It is 19,000. It's over 1% copper.

Q. What if --

A. And there's a copper smelter 10 feet away.

Q. Well --

A. And so you're trying to tell me that it was a plant 40 miles up the road that hauled the slag here and dumped it in this ditch right next to the smelter?

Q. Dr. Flowers --

A. Which is more likely?

Q. Dr. Flowers, what if there's another copper smelter two miles away?

A. There is?

Q. I'm asking, what if there is one?

A. I don't know of one two miles away.

Q. If there is one two miles away,

then the slags -- I mean, it's less likely, I'll give you that, but, I mean, once you put the slags in a truck, you know, there's not a huge difference between a quarter of a mile and two miles, is there?

MR. GERMAN: Objection to the form and foundation.

A. I have no way of knowing if there was a smelter -- copper smelter equivalent in size to the USMR two miles away from it.

Q. Does it have to be --

A. And whether or not they would accept waste from another -- they got their own waste problems. They don't want any extra waste.

Q. Is it your testimony that the sample that we have been talking about in this linear feature was on the smelter site?

A. No. It's not on the site itself. It's emanating from the smelter site.

Q. And do you have an opinion -- I just want to make sure -- we've talked about this before, but do you have an opinion as to whether or not that linear feature is as

a result of air deposition or if it's as a result of the placement of waste materials?

MR. GERMAN: Objection. You can answer.

A. I don't know.

Q. You don't know one way or another?

A. I think it's both.

Q. And how would you answer that question?

MR. GERMAN: Just did.

MR. SUTHERLAND: No.

Q. How would you answer the question of whether it came from air deposition or whether it came from waste materials?

MR. GERMAN: You can answer.

A. I think you would have to do a complete sampling of the linear feature, you'd have to look at it and see what's in it.

Q. And how would you go about seeing what's in it? What particular analyses would you do?

MR. GERMAN: For that ditch?

MR. SUTHERLAND: For -- to distinguish between air deposition and waste materials.

A. The size of the particles. If I saw globules --

MR. GERMAN: Object --

MR. SUTHERLAND: Let him answer.

MR. GERMAN: No. I want to get my objection on the record because I don't know if you're talking about ditch or you're talking generally or you're talking about class area, so I want to know what question he's answering.

Q. I'm talking about the linear feature, and I want to know what analytical tools would you use to distinguish between air particulate emissions and the disposal of waste materials.

MR. GERMAN: Objection. You can answer.

A. You would look at what's in the ditch.

Q. And what specific analytical tools would you use to look at what's in the ditch?

A. I think with these kind of numbers, I might take the soil and sive it

to try to extract particulates from it and I might look at them under a microscope.

Q. So you would look at, for example, the size of the particles would be one thing; right? Correct?

A. Sure.

Q. And because you would expect air particles to be smaller than waste particles; right?

A. Maybe, maybe not, that close to the smelter.

Q. You would also look at the morphology of the particles or the pieces?

A. Yeah.

Q. Would you look at the chemical composition of the pieces?

A. Yeah. But I wasn't tasked to do that.

Q. Okay.

A. In fact, I didn't know this thing existed until I contoured it.

Q. Okay.

Did you look, once you figured out that it existed, did you look at the boring logs?

A. No.

Q. Would the boring logs have given you any useful information in determining whether or not the material was a waste material or whether it was as a result of air emissions?

A. They might have, but I haven't done that yet. I may be asked to do that.

Q. Do you know if the microscopy work that was given to you at Exhibit 549 includes some microscopy work of the material that was removed from this linear feature?

A. No. I don't know that.

Q. Would that have been helpful to you to have some microscopy analysis in determining whether or not this linear feature was as a result of air emissions deposition or placement of waste materials?

MR. GERMAN: Objection.

A. Again, I wasn't asked to do that. I was asked to say whether or not the smelter impacted areas, and it clearly impacted this area, so I didn't need -- the chemical analyses were sufficient to tell me that it had been impacted.

Q. Well, wasn't part of your assignment to specifically look at the air deposition conceptual site model?

A. It was to look at --

MR. GERMAN: Objection.

A. -- the conceptual site model, the licensed mediation specialist says the predominant way of transport is air deposition, Arcadis says the predominant way of transfer waste into the class area is air deposition, and I agree with them.

Q. But you didn't --

A. That's not to say that other things didn't happen.

Q. Okay.

And in this case, this linear feature may be one of those locations where other things happened; right?

A. Sure.

Q. Okay.

MR. SUTHERLAND: I'm about to change topics, I don't know -- it's 12:23. We could take a lunch break or we could keep going for another 30 or 40 minutes?

MR. GERMAN: Up to everyone else.
THE WITNESS: I'm fine.
MR. SUTHERLAND: Okay.
THE WITNESS: Just let me get some water.
THE VIDEOGRAPHER: We are going to go off the record at 12:24, ending media unit number 3.
(Lunch recess taken.)
THE VIDEOGRAPHER: Back on the record, 1 p.m. This is media number 4 in the deposition of Flowers.
CONTINUED BY MR. SUTHERLAND:
Q. Dr. Flowers, before our lunch break we spent some time at least briefly introducing the topic of your use of Spearman non-parametric correlation coefficient.
Do you remember that?
A. Yes.
Q. Can you describe for the judge and the jury what is -- what does a Spearman nonparametric correlation coefficient measure?
A. It measures the degree to which multiple variables from 2 onward vary sympathetically, monotonically increasing,

monotonically decreasing. If the correlation coefficient is positive, then that would indicate a monotonic positive increasing relationship. If they are decreasing, then it would be a decreasing relationship. And it measures the strength -- you do two things with it. Strength, you usually look for one above .5, and whether or not it's statistically significant, and statistically significant means what are the odds that this relationship can occur randomly just because of chance, like what we were exploring earlier, a little bit of lead paint, a little piece of pipe, a little piece of arsenic-bearing waste magically appearing in the same place to give this relationship, and a Spearman coefficient indicates that that's highly improbable because the significance is much less than 1 in 10,000.

Q. Where does the 1 in 10,000 come from?

A. Well, that's calculated as part of -- it was provided in the auxiliary materials, it gives the significance of the

correlation coefficients.

Q. Okay.

A. It's not in -- I just say -- I may reference it by saying P is much, much less than .0001.

Q. Okay.

And it's correct to say that the Spearman correlation coefficient process, it takes in this case the concentrations of the metals and it converts them into a numerical integer; correct?

A. More precisely, it ranks the numerical values.

Q. So, for example, if you got a sample set, the very highest value is going to get a rank -- the highest value gets a rank of like 1?

A. No. It's the other way around.

Q. Okay.

A. The lowest value gets a rank of 1, the highest value gets a rank of N where N is the size of the data set.

Q. Okay.

And so to just make sure we're talking about the same thing, if our data

set had a hundred samples in it, the highest value would have a rank of 100; correct?

A. Yes. If they were all distinct values, that would be true.

Q. And then the next highest value would have a rank of 99?

A. Yes.

Q. All right.

(Exhibit 554, short table containing Sample Dataset and Spearman Correlation, marked for identification, as of this date.)

Q. Okay. So I -- because statistics are sometimes confusing, I went ahead and I prepared a short table. Just so we can get this for the record, I'm handing you what I've marked as Exhibit 554, and this does not -- the data here doesn't have anything to do with this case. I just, in terms of the data that was collected in the field, I just made this up. Okay?

A. Okay.

Q. But I just, for purposes of illustration, I just picked four samples, and I just assigned concentrations to lead,

copper and arsenic to those four samples.

Do you see that?

A. Yes.

Q. And so for Sample 1, for example, it's 500 ppm lead, 295 ppm copper and arsenic 40 ppm; correct?

A. Right.

Q. And then what I did for these four samples is then I just ranked them according to which is the highest and which is the low -- you know, second highest, which is the third highest, and it looks like I probably did it backwards because I think I put the highest one --

A. Yes, you did do it backwards.

Q. Yes. But nevertheless, the process, if you just flip the integers, that's the way that Spearman works; right?

A. Right.

Q. And in this particular case because the order of the lead and the copper and the arsenic concentrations, the ranking is the same for all three metals, for all four of the samples, do you see that?

A. Yes.

Q. And so what the result would be from a Spearman analysis of this particular small set of made up samples would be you would get a Spearman correlation coefficient of 1 across the board; right?

A. Right. All the ranks are correlated.

(Exhibit 555, short table with Sample Dataset and Spearman Correlation, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as 555, and I've added three columns to this one.

Do you see that?

A. Yes.

Q. Where I've added the lead to copper ratio, the lead to arsenic radio and the copper to arsenic ratio.

Do you see that?

A. Yes.

Q. And the samples themselves, I'll represent to you, are unchanged, the values are the same.

Do you agree with that?

A. Yes.
Q. And what I'm trying to illustrate here is that the Spearman correlation coefficient, it doesn't give you any information about variability within those metal ratios; is that right? Would you agree with that?
A. Not within the ratios; no. Because I didn't do ratios.
Q. And the Spearman analysis that you did wouldn't really give you any information about what those ratios and what those ratios might vary across the proposed class area, would it?
A. It might.
Q. It might and it might not?
A. I don't know.
Q. You don't know. Okay.
Do you ever use principal component analysis in your work?
A. I teach it.
Q. Okay.
Did you consider using principal component analysis here?
A. I could tell from looking at the

data that the first eigenvalue was going to be copper, that's the main variable that's varying across the class area, but I didn't pursue it beyond that.

Q. If you could look at Exhibit 547 for me, it's the Geosyntec document.

A. Okay.

Q. And if you could turn to Bates USMR01074664. Do you see on Bates 664 that that's a diagram from a principal component analysis; correct?

A. Yeah. It's consistent.

Q. And it shows that the transect samples which are encompassed within that trapezoidal figure are distinct from the site sample numbers which are down in the lower right corner; correct?

MR. GERMAN: Objection.

A. That's what the graph says.

Q. And it's your testimony that you didn't see Exhibit 547 before you issued your report; correct?

A. That's correct.

Q. If you had reviewed Exhibit 547, could you have at least drawn some basic

conclusions regarding the principal component analysis that was conducted by Geosyntec?

A. If I had all the background information, what the loadings on the components are, things like that, the data.

Q. If you had had the data, you could have done your own analysis to confirm or deny?

A. If I had everything that went into this diagram, I could have done this analysis; yeah.

Q. But it's your testimony that you weren't asked to do that prior to completing your report; correct?

A. Right.

Q. And you don't know whether or not all those materials were produced to the plaintiffs or not; right?

A. What materials?

Q. You don't know whether all that underlying data and analysis that underlies this particular figure --

A. I do not.

Q. -- whether that was available --

A. I don't know.

Q. -- to the plaintiffs' lawyers? You don't know that?

A. I don't know.

Q. On page 8 of your report --

A. Okay.

Q. You -- under chemical characteristics of smelter emissions, do you see that?

A. Yes.

Q. And one of the things there is that you state in your report most of the particulates, 80%, were less than 53 microns in size.

A. According to Okanigby, et al. 2017 for a smelter in South Africa.

Q. And so that gave you information, at least general information for another smelter as to what kind of particulate size you would expect from a smelting facility; is that right?

A. Yes. Most of them are less than 53 microns.

Q. And then you go on and state that compositionally, those particulates, you would expect to have copper in them with

smaller amounts of lead and zinc; is that right?

A. Yes. They didn't report any analyses for arsenic.

Q. And did you -- did you compare -- the ratio that you got there of the composition of those particulates, the copper is about 120 times higher than the lead; right?

A. Right. But these are samples taken from electrostatic precipitators. This would be the strongest signal of the smelter.

Q. Did you compare that ratio of copper to lead for what you're observing in soil samples within Carteret?

A. No, it's a different smelter.

Q. And because it's a different smelter, you expect it to be different?

A. It may be the same, it may be different. I can't tell.

Q. But the answer to my question is you didn't look at it as --

A. No, I didn't.

Q. -- being indicative of what you

would expect within Carteret?

A. No. It was illustrated.

Q. And then you go on to say that the morphology of the particulate you would expect to be spherulitic particles; correct?

A. Yes.

Q. And so setting out on page 8, you've essentially identified at least a starting point for what you would expect the air emissions from the smelter to look like as far as particle size, chemical composition and morphology; right?

A. With the --

MR. GERMAN: Objection. You can answer.

A. With the exception I don't know what arsenic to expect. If it's two things, if it's dust per se, then it's going to be different than something that condenses from a gas phase. The gas phase will be the spherulitic material. So what this is, again, is illustrative of what can happen in a smelter.

Q. You could have used what you define on page 8 of your report as a starting

point at least to do some microscopy analysis to look for particles that meet these criteria; correct?

MR. GERMAN: Objection.

A. I didn't consider it necessary to do that.

Q. But you could have based upon what you've outlined on page 8, you could have done that?

A. You could do all kinds of things, but I didn't think it was necessary. I didn't do it.

Q. Okay.

But that's what you did in your case in Pennsylvania with the coal fire --

A. But that was what I was tasked to do, was to look for the presence of fly ash on properties as opposed to chemical contamination.

Q. Okay.

A. Now, the problem with microscopy is that if you take a sample, you separate it, you magnify it, and you characterize it, it's very difficult to get back to what the bulk sample is going to read in terms of a

chemical analysis. So if you see like a piece of lead paint, you don't know how many pieces of lead paint are in a six inch core sample. There my be one. There's a lot of soil particles, a lot of weight that is not lead paint, and so it may be diluted out so it's insignificant. It's very difficult to go from the microscopic to the macroscopic.

Q. They're really two different analyses in terms of what you learn from them; correct?

A. Right.

Q. I mean, microscopy is much more useful at identifying particular types of materials in terms of identifying their source; right?

MR. GERMAN: Objection.

A. It is --

MR. GERMAN: You can answer.

A. It is useful in determining what the particle is, what its shape is, how big is it, what its chemical composition is, but it has very little relevance to a bulk sample.

Q. Yeah. If I understand you correctly, what you're saying is that you

really can't translate what you get from a scanning electron microscope with EDS to a concentration of lead in a soil sample; right?

A. That's correct.

Q. If you go back to page 2 of your report and look under Roman 5, the fifth numbered paragraph, about two thirds of the way of that paragraph, there's a sentence that starts numerous individual sources.

Do you see that?

A. Yes.

Q. And the sentence reads: Numerous individual sources would give rise to a more highly random localized pattern of contamination that is not observed in the thousands of samples taken in Carteret.

Do you see that?

A. Yes.

Q. How is that characterization of a highly random localized pattern different from what we see in the variograms in the transects for Exhibit 547? And I'm referring specifically to the Bates pages that begin with USMR01074711.

MR. GERMAN: Objection.

A. Well, let's go back to what we were just talking about. We have a soil sample and we'll take your hypothesis that that soil sample, the lead loadings, the arsenic loadings and the copper loadings are due to everything else except the smelter, and we have one soil sample and we see this in, for example, some of the data taken on parcels, it will be clean here, it will be high here, it will -- you know, it varies all over the place, and so -- but to get a generalized pattern of copper contamination as is seen in the class area, you can't -- it seems to me very improbable that you can get individual sources to give you that answer.

Q. Are you -- are you relying on the Spearman analysis to reach that conclusion?

A. You can look at the samples. The samples are contaminated with copper all the way out to the edge of the class area.

Q. I mean, what's confusing me, Dr. Flowers, is you just described a property where you had concentrations varying from bore hole to bore hole and you said the concentrations vary all over the place I

think was your words, and how is that different from a highly random localized pattern that you say is associated with numerous individual sources?

A. Well, first of all --

MR. GERMAN: Objection. You can answer.

A. First of all, I was giving a hypothetical. And my hypothetical was how do we get an entire class area contaminated with highly correlated metals using individual sources, and it would require every source to be present most of the time in every sample, and for when one source went up, when one element went up, the others went up, when it went down, the others went down. That's very difficult to do with individual sources. You have to go, you know, and get the right amount of lead paint, you have to get the right amount of some coppers from somewhere, you have to get the arsenic from somewhere if you want to take those, whatever your alternative sources are, and the idea that somehow they all line up and they give this pattern that we see in the

class area, I find that to be very improbable.

Q. Well, you haven't evaluated the relative ratios of the metals; right?

A. I don't think you have to.

Q. Well, I think there's probably just going to be a disagreement about that.

A. Well, I think we can agree to disagree. I say you have a big source, giant source. Let's go way back in the beginning of the smelter. Produced 10,000 tons of copper. The concentrate it was fed, let's just be very generous and say it was point 4% copper, I mean, 40% copper, well, that means it would produce 75,000 tons of waste material, and that waste material would be slag, it would be stuff coming out of the stack, no air pollution control. When the first smelter came online, it was an open pipe to the atmosphere. It's entirely feasible that the contamination -- most of the contamination could have occurred then.

Q. You haven't done, and I think we've already established this, but just to make it clear, you haven't done any kind of

emissions inventory that would quantify how much emissions went out as air emissions versus what was produced as slag from the fraction of non-copper, you haven't done that, have you?

A. I can say the slag was more tonnage than the air fall, but the exact numbers, I don't -- but tons went into the air and tons went on the ground.

Q. Another thing that you have not done is you have not done any kind of analysis of when the properties were built within Carteret and how much lead was contributed to this community by the use of lead-based paint over the years; correct?

A. Well, I would put it to you this way. You could take all the lead-based paint that was scraped off every house in Carteret and weigh it and it was nothing like what came out of that smelter.

Q. Have you done that calculation?

A. No, I haven't.

Q. Your testimony is you don't have to?

A. No, I don't, because smelter

produces at the ton level, and lead-based paint is low density, it's not very thick on the side of the house. I guarantee you there's more stuff coming out of the smelter than there is coming off a house.

Q. Your testimony is that lead-based paint is low density?

A. Compared to a smelter waste. Have you picked up a chip of paint? Does it go (indicating)?

Q. Have you --

A. It's not just lead in the lead paint.

Q. You haven't done -- you haven't done a mass balance of --

A. No one can do a mass balance because they don't have the data.

Q. Well, you can estimate it; right?

A. Well, sure.

Q. I mean, we know -- we know roughly what the lead content of paint was historically; right?

A. Okay.

Q. Isn't that true?

A. You can get some idea.

Q. And we can look at a house and see how much paint its surface had; correct?
A. Sure.
Q. And we could look at based upon the age of the house under a normal repainting cycle how many times it was likely painted; correct?
MR. GERMAN: Objection.
A. Sure.
Q. And we can come up with a number of approximately how much lead was added to that property based upon the historical use of lead-based paint?
MR. GERMAN: Objection.
A. I don't think you can go that far.
Q. Well, but, I mean, you can at least get to the total mass, even if we're not down into the total soil yet --
A. Yeah.
Q. -- we can get to the total mass of lead that was put on the house.
A. You can get an estimate; sure.
Q. And you told me in the prior deposition that we had on the Kay County case everything breaks down; right?

A. Sure.
Q. I mean, that's entropy; right?
A. Yeah.
Q. And so a lot of that lead is going to break down from the paint and it's going to end up in the yard, isn't it?
MR. GERMAN: Objection.
A. It has potential for ending up in the yard, but I guarantee you what's coming out of that smelter is a lot more.
Q. But you haven't done the calculations to --
A. I don't have to do the calculations. All I know is that thing produces 80,000 tons of copper or 70,000 tons of copper and produces 75,000 tons of waste, it's a high temperature process, it's got a stack, it may or may not have had air pollution control, the ores are typically laced with arsenic and lead, so you have a pollution generator. You also have a copper smelter, but it's also a pollution generator. And it dwarfs the rest of the sources.
Q. And you're not an air emissions expert; correct?

A. No, I'm not.

Q. And you have not --

A. But that, I don't think you have to be to make my -- the statement I made.

Q. That's fine.

And you have not done a quantitative calculation of even if we accept your postulation as to the historical record, you haven't done a calculation as to how much of that waste --

A. I don't think anyone --

Q. Let me finish --

A. -- can do that --

Q. -- my question.

A. -- that calculation.

Q. Let me finish my question.

A. Yeah.

Q. You have not done a calculation of how much of those materials actually ended up in the proposed class area?

A. No one can do that calculation.

(Exhibit 556, study entitled Extent, Characterization, and Sources of Soil Lead Contamination in Small-Urban Residential Neighborhoods,

marked for identification, as of this date.)

Q. I hand you a document which I've marked as Exhibit 556.

Have you ever seen that document before, Dr. Flowers?

A. No.

Q. Exhibit 556 is a study that's entitled Extent, Characterization and Sources of Soil Lead Contamination in Small-Urban Residential Neighborhoods.

Do you see that?

A. Yes.

Q. And the authors are Jeffrey Clark and Andrew Knudsen.

Do you see that?

A. Yes.

Q. And in the abstract of the article, the first sentence states: We present high spatial-resolution mapping of soil lead concentrations in a small-urban residential setting.

Do you see that?

A. Yes.

Q. Would you agree that Carteret is

a small-urban residential setting?

A. Yes, with a smelter.

Q. And then the authors go on to say that they did x-ray fluorescence and used -- was used to measure soil at 170 properties in the City Park neighborhood of Appleton, Wisconsin.

Do you see that?

A. Yes.

Q. And they -- then if you skip a few lines down, they indicate that they sampled in three front yard locations, the drip line, the mid-yard and the terrace at 71 properties.

Do you see that?

A. Yes.

Q. And their results, they summarize a few more lines further down, they say: Approximately 40% of the yard space exceeded concentrations of 400 micrograms per gram, which I think is the same thing as parts per million.

Do you agree with that?

A. Yes. That's what it says.

Q. And they indicate that these

patterns of contamination are consistent with lead paint as the main contributor of lead to soil.

Do you see that?

A. Yeah.

Q. If you jump over to history of lead use in the residential environment, the first sentence states: The two main sources of lead in urban residential environment are combustion of leaded gasoline and the deterioration of exterior paints.

Do you see that?

A. Yeah.

Q. And then they go on, skipping a few sentences, the use of lead is a paint additive peaked in the 1920s, before advocacy and legislative efforts during the post-World War II housing boom led to a steep decline in the use of lead in house paints.

Do you see that?

A. Yes.

Q. And that statement is consistent with the discussion we had before lunch where we were talking about lead values for

older housing tends to be higher than those after the second world war or after 1950; right?

A. That's true.

Q. And then if you skip over to the next page at the bottom of the first column, the study -- the authors explain this study differs from previous works in two important ways. First, our study site is a small city rather than a major urban area. Second, we conduct a high spatial-resolution survey of, and they use an acronym SLL, that's -- I think that stands for soil lead level -- so they -- we conduct a high spatial-resolution survey of SLL, focusing first on a single residential neighborhood and then a city block.

Do you see that?

A. Yes.

Q. And this was a study that was done in -- well, let me ask the question. Do you know whether Appleton, Wisconsin has a smelter in it?

A. I would think probably not.

Q. And so the authors were seeking

to try and determine the impact on soil lead from lead-based paint into a lesser extent from automobile emissions; correct?

MR. GERMAN: Objection.

A. Yes.

Q. And then if we go over to page 1502, there's some box of whisker plots up there at the top of the page.

Are you there?

A. Yes.

Q. In the first column of that page about a third of the way down, the authors report: Nearly half the samples exceeded 400 micrograms per gram, and this zone, that is the exceedance of 400 ppm, extended several meters into the yard all the way around the home.

Do you see that?

A. Yes.

Q. And then we skip a sentence and then the authors go on: Where homes are close to one another (see, for example, the two homes in the northwest corner of Figure 1b), the concentrations tend to remain relatively high even in the mid-lawn area.

Do you see that?

A. Yes.

Q. Have you been to Carteret?

A. Yes.

Q. And the homes in Carteret, many of them are very close to one another; correct?

A. Yes.

Q. The authors then in this study go on to say: Soil lead levels near outbuildings are also often elevated.

And you would agree with me that in Carteret there is a high frequency of detached garages and detached storage areas; correct?

MR. GERMAN: Objection.

A. I --

MR. GERMAN: You can answer.

A. I didn't look for them specifically, but I would suspect there are.

Q. And it's also true then in a community as old as Carteret, a lot of times those older structures existed previously and have been torn down; correct?

MR. GERMAN: Objection. You can answer.

A. That's possible.

Q. So then the authors go on to state: The detailed-block study suggests that a large proportion of the soil in older neighborhoods is likely contaminated. Based on the interpolated data, approximately 40% of the yard area has soil lead levels greater than 400 parts per million.

Do you see that?

A. Yes.

Q. And then if we look at the right-hand box and whisker plot that's up in Figure 2, this reports the lead concentrations for the drip line, the mid-lawn and the terrace; correct?

A. Yes.

Q. And if you look at the larger, I think what we're looking at is the larger of the two is -- shows all of the data --

A. Mm-hmm.

Q. -- even the high points, and the one that's kind of inset inside the larger one is just showing the boxes for the 25th percentile and the 75th percentile and the median value; correct?

A. Well, I think it's just another representation of the lower diagram.

Q. Right. Yeah. But it gives you a little bit better idea of where the 25 percent and 75 percentile levels are; right?

A. Sure, in this town.

Q. And if you look at the mid-lawn -- well, let me back up.

You would agree with me based upon the definitions that I've read to you from this paper, the mid-lawn's not -- it's out in the middle of the yard; right?

A. Yes.

Q. And in this particular town, without a smelter, there were mid-lawn samples that approached 4,000 parts per million; correct?

A. Some samples; yeah.

Q. And if you look at the smaller inset up above there, the 75 percentile number, that is the top of the box for the mid-lawn, that's around 500 parts per million; right?

A. 400 -- mid-lawn? Yeah. 500.

Q. Yes. Because I think that dash line is actually 400.
A. Yeah. That's what it is.
Q. And let's go back and look at Mr. Sullivan's averages for the class area. So looking at Mr. Sullivan's average for the class area and the top zero to six inches that we can see on Exhibit 550, what was the average concentration in the class area according to Mr. Sullivan in that top interval?
MR. GERMAN: Objection.
A. It's not average.
Q. Or median. I'm sorry. I keep doing that.
What was the median concentration?
A. For -- once again?
Q. For the zero to six inch top interval.
A. 250. Consistent with the lead paint diagram.
Q. You say it is consistent with the lead paint diagram?
A. I mean, the numbers are different.
Q. The number from Carteret is actually less than the number from Appleton,

isn't it?

A. For the median, yeah.

Q. And Appleton had lead-based paint, but it didn't have a smelter; right?

A. It's true.

Q. If you could flip over to page 1505, if you look in the middle of that first column, there's a paragraph that starts with our study area.

A. Yes.

Q. Do you see that?

A. Yes.

Q. And the first two sentences read: Our study area is not exceptional and the trends we report here are likely to be similar in smaller urban residential communities across the country. We know that the best predictor contamination is the age of the structure with those built before 1960 returning significantly higher soil lead levels.

Did I read that correctly?

MR. GERMAN: Objection.

A. Yes.

Q. Do you have any reason or basis

to contest the authors of this paper, that is, Mr. Clark and Mr. Knudsen's, conclusion that their results are not exceptional and are likely similar to other smaller urban residential communities?

MR. GERMAN: Objection. He hasn't read the whole paper, but --

A. Well, without a smelter.

Q. Well, you would suspect that a community without a smelter would actually have lower lead concentration levels than one with a smelter, all other things being equal; right?

MR. GERMAN: Objection. Same objection.

A. Maybe, maybe not.

Q. All other things being equal, one community has --

A. What do you mean by things being equal?

Q. Everything like housing age, housing condition, housing maintenance, all the things that relate to lead-based paint, traffic volume, all of the things that lead to that, you have one community that has a

smelter and one community that doesn't, you would expect the community with the smelter to have higher lead concentrations; right?

MR. GERMAN: Objection. Form. Foundation, incomplete hypothetical.

A. The smelter would be an additive component.

(Exhibit 557, census data for Carteret, marked for identification, as of this date.)

Q. I hand you a document we've marked as Exhibit 557.

Have you looked at the census data for Carteret?

A. No.

Q. I'll represent to you that Exhibit 557 is a census data that I just printed off of the internet on the housing stock within Carteret.

Do you understand that?

A. Yes.

Q. And if you just look at the first page of Exhibit 557, there's an indication on housing units, the year that they were built.

Do you see that?
A. Yes.
Q. And it indicates for houses built between 1950 and 1959 that those make up 26.7% of the Carteret housing?
A. Yes.
Q. And then from built from 1940 to 1949, they represent 13.4% of the --
A. Yes.
MR. GERMAN: Objection.
Q. And then built prior to 1939, that's 16.6% of the housing stock; correct?
A. Yes.
Q. And you would agree with me that those three age ranges are the ones that are most likely to contain significant quantities of lead-based paint; correct?
MR. GERMAN: Objection. You can answer.
A. At one time, perhaps.
Q. And if we look at those totals, that's more than 55% of the housing stock in the community of Carteret; correct?
A. Yeah, if you add the numbers up.
Q. Dr. Flowers, if you go to

Exhibit 548, it's the Overview of Alternate Sources of Copper, Lead and Arsenic.

A. Okay.

Q. And this is a presentation that's dated October 26, 2018; correct?

A. Yes.

Q. And so that was from seven, over seven months ago; right?

A. Yes.

Q. And if you look, the initial section of Exhibit 548 evaluates the historical use of land for agriculture in Carteret and chemical use associated with those agricultural activities.

Do you see that?

A. Yeah.

Q. And if you turn to Bates USMR01155857, there's a map of Carteret from 1850.

Do you see that?

A. Yes.

Q. And there's a reference for that map that's included on that PowerPoint slide that indicates where it came from; right?

A. Right.

Q. And as part of that map, there are names that are circled as farmers who or at least people who lived within Carteret during that time period.

Do you see that?

A. Yeah.

Q. And then if you go to, skip a few pages to USMR 01155860.

A. Okay.

Q. You will see a copy of a page from the 1850 farm census.

Do you see that?

A. Yeah.

Q. And I realize it's difficult to read, but there's a reference on which census and where that data came from; correct?

A. Yes.

Q. And what the consultant has done here is they've identified the farmers that are circled on the map by name on the census itself.

Do you understand that?

A. Yes.

Q. And you don't have any information as you sit here today that would

suggest to you that those farmers weren't actually farming in the Carteret community in the time period for this particular presentation, 1850, do you?

MR. GERMAN: Objection.

A. No, I don't have anything to contradict it.

Q. And the census sets out that those farmers were growing things like potatoes and orchard produce on the farms that they were actively farming at that point in time.

Do you see that?

A. Yes.

Q. And if you go through this presentation, and I don't want to go through every single page, but there are subsequent maps for 1876 and then census data for 1870, a map for 1887 and then the data from the 1880 census on crops that were grown.

Do you see that?

A. Mm-hmm.

Q. Is that a yes?

A. Yes.

Q. Okay.

And, again, you don't have any information as you sit here today that any of the information that's presented with respect to these maps, the location of these farmers and the crops that they grew at the relevant time periods are inaccurate or incorrect; right?

MR. GERMAN: Objection.

A. No, I have no information about this. I haven't looked at this.

Q. And there are references that are included in these PowerPoint slides for all the underlying information that's reported here; correct?

A. Yes.

Q. And you could have, if you had had access to these documents prior to doing your report, have obtained those references and cross-checked this information; right?

A. I don't see why I would have, but I could have.

Q. You could have done that; right?

A. You can do lots of things, but I couldn't -- you know, I don't see any purpose.

Q. Okay.

And then if you go on to the next page, USMR01155874, there's a citation to a document by Donald EH Frear, Chemistry of Insecticides and Fungicides from 1948 and a quote from the Colorado potato beetle.

Do you see that?

A. Yes.

Q. And this document, Mr. Frear's Chemistry of Insecticides and Fungicides, reports that by 1874, copper arsenates were used to control the Colorado potato beetle.

Do you see that?

A. That's what it says; yeah.

Q. And you don't have any reason to believe that that's not true; right?

MR. GERMAN: Objection.

A. The only comment, which I do mention, is that first Paris Green was phytotoxic if it was oversprayed, and secondly it was replaced later on by the lead arsenates, but the fact that there were pests and needed -- they needed control according to the farmers, that's a possibility, and the report on pesticide use in New Jersey, they make a point that the

intensive use of pesticides was more for commercial operations rather than individual farms, but it's impossible to know what frequency of use, whether they used them at all. It just says the worms were there, the farms were there, but there's no connection between the two.

Q. Well, we know based upon these documents that the farms were there, as you say; right?

A. Yes.

Q. And we know based upon these documents that the farmers were growing potatoes; correct?

A. That's true.

Q. And we know that from contemporaneous documents that potatoes were subject to infestation with the Colorado beetle; correct?

A. That's true.

Q. And we know that during this time period the pesticide that was applied to control the Colorado beetle was Paris Green; correct?

MR. GERMAN: Objection to form.

A. But we don't know if these farmers spent the money to buy the pesticide to put on it.

Q. But the answer to my question is yes, we know that Paris Green was used to control for the potato beetle, we may not know if the particular farmers used it --

A. We don't know if it was used here.

Q. Right. But we know as a general matter for the agricultural community in the late 1800s, Paris Green was an insecticide a that was used to control the Colorado beetle?

MR. GERMAN: Objection.

A. Predominantly in commercial operations.

Q. All right.

Let me address your attention to USMR01155876.

This is an advertisement from The Independent Hour, which was a newspaper in Woodbridge, New Jersey, from June 8 of 1876.

Do you see that citation?

A. Yes.

Q. And do you know where Woodbridge,

New Jersey is?

A. Not exactly.

Q. It's just south of Carteret.

A. Just south?

Q. Yes. And it was at this point in time the largest community around these farms.

Will you accept that?

MR. GERMAN: Objection.

That's --

A. I'll take your word for it. I don't know.

Q. And a local newspaper had an advertisement from a hardware store.

Do you see that?

A. Yes.

Q. And that hardware store was advertising potato bug exterminator.

Do you see that?

MR. GERMAN: Objection.

A. Right.

Q. And that is -- and then right above that, that's Paris Green; right?

A. Yeah.

Q. And that would suggest that not

only big commercial farms, but hardware store customers were using Paris Green to control the Colorado potato beetle; right?

MR. GERMAN: Objection.

A. I don't think that necessarily follows. It might have sat on the shelf --

Q. Well, they were --

A. -- because it was too expensive.

Q. Well, they were at least advertising it in the community; right?

MR. GERMAN: Objection.

A. Maybe that's why they were advertising it. If it flew off the shelves, they wouldn't be advertising it.

Q. Is that why they're advertising agricultural implements, too, is because they're not being sold?

MR. GERMAN: Objection.

A. Well, I'm just saying that buying chemicals may have been too expensive for --

Q. But you don't --

A. -- individual farmers. I don't know that. You don't know that.

Q. Right. I mean, nobody -- we

don't --

A. No one knows that.

Q. Okay. Fine.

And then if you jump over to the next page, this is Bates 1155877, there's another little newspaper article from the Courier Post in Camden, New Jersey from June 27 of 1885.

Do you see that?

A. Yes.

Q. And it indicates that Paris Green for killing the potato bugs, that some families were poisoned because they ate strawberries next to where the potato patch was?

MR. GERMAN: Objection.

A. Yeah.

Q. Is that what it says? Yes?

A. That's what it says.

Q. And that suggests that at least one farmer in Rahway, which is just north of Carteret, was using Paris Green to control Colorado potato beetles; correct?

MR. GERMAN: Objection.

A. Yes. And he got a little

rambunctious with the spray.

Q. Do you know what caused the famine in Ireland when all the potatoes died?

A. Pests.

Q. It was fungus, wasn't it, the potato famine was a fungus?

A. A pest; yes.

Q. And you would agree with me that potatoes are particularly susceptible to fungus; right?

A. Yes.

Q. And if you look at Bates 1155879, the most common fungicide at that point in time was something called the Bordeaux mixture.

Do you see that?

(Witness reviewing document.)

A. Yes.

Q. And the Bordeaux mixture was a mixture of copper sulfate and lime; right?

A. Right. But this refers to treating fungal diseases on grapes.

Q. Well, if you go to the next page, the State Board of Agriculture for New Jersey recommended the Bordeaux mixture in

1889 to treat potato blight, didn't it?

(Witness reviewing document.)

MR. GERMAN: Objection.

A. Yes.

Q. If there was a farmer, and we know that they were growing potatoes, but if he wanted to protect his crop against potato blight and he applied the Bordeaux mixture to his potatoes, he would be introducing copper to the soil where his farm is; right?

A. If everything you say is true, that would be true.

Q. Turn to page Bates 1155888. This is a citation to a paper by it looks like Hangsford entitled Elements in Fruits and Vegetables From Areas of Commercial Production in the Coterminious States, it's a U.S. Geological Survey publication.

Do you see that?

A. Yes.

Q. And one of the things that this study was reporting on was the concentration of copper in soils where potatoes were grown.

Do you see that?

A. Yes.

Q. And the study reports that the mean copper value for potatoes -- for potato field soils in New Jersey for the soils that they tested was 140 parts per million.

Do you see that?

A. Yes.

Q. And that's the mean there, that means the average; right?

A. Yes.

Q. And so there would be values and, you know, approximately half of the values are going to be higher than 140 parts per million; correct?

A. Right. But they're not over 3,100.

Q. Do you know what the average copper concentration is in the transects and the samples that the plaintiffs collected?

A. It's not 3,100. It's much less than that.

Q. Do you know --

A. It's in my table.

Q. Do you know if it's greater than 140?

A. Yes.

Q. It is greater than 140?
A. Yes. I'm pretty sure.
Q. Let me see.
A. Let's check it to be sure.
228.
Q. 228.
A. Are we still on the same document?
Q. We may be done. Hold on. No, I'm not done.
If you go to page 26 of your report. If you look at the second complete paragraph on page 26.
A. Okay.
Q. The first sentence states: Historical fill is mainly used to create land by filling in waterbodies. A map of the Carteret area shows that portions of the Arthur Kill were filled near Carteret, but there is no indication of widespread use of fill in Carteret proper, especially where sampled by USMR.
Do you see that?
A. Yes.
Q. What evaluation, research did

you do to reach the conclusion that there is no indication of widespread use of fill in Carteret proper?

A. The State of New Jersey produces a set of maps that shows where fill was used.

Q. Did you do anything besides look at the New Jersey fill maps?

A. No.

Q. So you did not look at the boring logs, for example --

A. No.

Q. The boring logs can give you information regarding the presence of non-native materials that are typically associated with fill; right?

A. Yes.

Q. But you chose not to do that?

A. Right.

MR. GERMAN: Objection.

A. Again, I considered all fill, pesticides, fungicides, your whole laundry list in here to be a second order effect compared to the smelter which was the dominant effect.

Q. If you could go back to Exhibit

548, that's the historical document.

A. Okay.

Q. And turn to Bates 1155898. And there are three little snippets from the Carteret Press, one from 1928 and one from -- well, two from 1928 and one from 1937.

Do you see that?

A. Yes.

Q. And the first one reports that there was a gap in Everard Street and that that gap would be filled by putting in garbage.

Do you see that?

A. Yes.

Q. And then the second one from 1928, Councilman Andres, reporting for the street and road committee, said that satisfactory results had been obtained by using a residue furnished by the Warner Chemical Company for filling holes and building up the streets in low places.

Do you see that?

A. Yes.

Q. Do you know what the industrial waste was that Warner Chemical Company

contributed to the streets?

A. No, I don't.

Q. Do you know whether or not it contained any of the contaminants of concern?

A. No, I don't.

Q. And then it goes on in the '47 newspaper article that ash from pulverized coal becomes molten slag which flows in a continuous stream from the furnace bottom and drops into water where it can -- okay. That's not talking about the streets.

If you go to Bates 1155903. Are you there?

A. Yes.

Q. Do you see the citation here, these are notes in the Carteret Borough City Council Meeting Minutes.

Do you understand that?

A. Yes.

Q. And the notes, for example, from 1903 indicate that the road committee reported the need for 150 loads of ashes to be used on crosswalks.

It's a little bit difficult because it's handwritten, but do you see that?

A. Yes.

Q. And then in 1926 the street and roads committee, Andres said ashes were needed on Sharot Street and that they could be had at the Warner Chemical Company now.

Do you see that?

A. Yes.

Q. And then if you go back to Bates 1155901, what the consultant did here is that they looked at those meeting minutes and highlighted the streets where the streets and road committee identified the use of fill materials to maintain the streets.

A. Yes.

Q. Do you understand that?

MR. GERMAN: Objection.

Q. And that indicates a relatively broad application of ash, cinder and slag at least in the AOC and the immediate transect area; correct?

MR. GERMAN: Object. You're mischaracterizing a document. You can answer. Form, foundation.

A. It's hard to tell. The AOC part, maybe. Transects, I don't know, maybe.

Q. If you had been provided the underlying information with respect to the PDF copies of the Carteret meeting minute notebooks and all the other information that was generated by this consultant, you could have at least done some due diligence as to the veracity of what the consultant is saying in terms of the use of non-native fill materials here; right?

MR. GERMAN: Objection.

A. Again, I would wait until there was an expert report that had the opinions laid out before I would comment.

Q. But this is enough information combined with the copies of the meeting minutes for you to at least evaluate the claim; right?

MR. GERMAN: Objection.

A. No. I don't agree.

Q. What else would you need?

A. An expert report.

Q. And what specifically in that expert report would be in the report that's not present here and in the materials supporting this diagram?

A. Well, I would think you would agree that an expert report represents a synthesis and I would have had time to look at it as opposed to getting it this -- right now and doing it, and the idea of having time plus a synthesis, I could respond to it better. I mean, everybody would do better if they had a set of opinions, a rationale, and the evidence all together and then were asked to respond. You'd get a better response as opposed to going through this document and reading about where ash was put on a certain -- you know, by Carteret or whatever. The problem is I can't connect these facts and I don't know if the facts can be connected. That's the problem. They're just facts.

Q. Well, you understand that this document contains a conclusion even if you don't want to call it an opinion, it contains a conclusion that non-native fill materials were widely used in the construction of the streets in Carteret; right?

A. I don't dispute that fill was used in Carteret.

Q. Okay.

A. I just say it's a secondary contributor compared to the smelter, which contributed over the entire class area.

Q. Well, and, I mean, just relating it back to the comment that we talked about before where you said there was no indication of widespread use of fill in Carteret property --

A. I'll tell you what you don't see in this.

Q. Can you answer my --

A. You do not see the smelter. You do not see an evaluation of the smelter as a source. You see everything else, including the kitchen sink as a source, but you do not see it compared to the smelter.

MR. SUTHERLAND: Objection.

A. Now, presumably an expert report, that analysis would be done.

MR. SUTHERLAND: Objection. non responsive.

Q. The -- I want to focus on your statement in your report that there's no indication of widespread use of fill in

Carteret proper.

Do you see that?

A. Again, widespread use of fill. What does widespread mean?

Q. It's your report. You tell me.

A. Widespread would mean Carteret's built on an island made of fill.

Q. Nothing less than that qualifies as widespread in your mind?

A. Not in my mind; no.

Q. Okay.

A. You know, a little ash on a road, a little ash under a sidewalk, a little ash in a low spot in the street, to me that doesn't mean widespread use of ash.

Q. You've testified in the past, haven't you, Dr. Flowers, that cinders and bottom ash from coal burning furnaces contain arsenic; correct?

A. Yes.

Q. And they contain enough arsenic to adversely impact the environment; correct?

MR. GERMAN: Objection. You can answer.

A. In large quantities, yes. Like

in a slag boiler ash pod. That's over a thousand acres and the berms break and it flows into a river. That's a pretty negative impact.

Q. Well, I mean, one of the concerns in the Pennsylvania fly ash case was the fact that the fly ash contained metals; right?

A. Absolutely.

Q. And there was potentially enough in those air emissions of fly ash from a coal burning power plant that you participated on behalf of the plaintiffs that it needed to be cleaned up; right?

A. Yes. Because it was on a property and in a house. But I would point out it was air deposition.

MR. SUTHERLAND: I seem to have lost something.

THE VIDEOGRAPHER: Why don't we close here.

MR. SUTHERLAND: Okay.

THE VIDEOGRAPHER: We are going to go off at 2:14 and we'll end media 4.

Okay. We're off the record.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: We're back on the record at 2:23. This is media 5 in the deposition of Dr. Flowers.

(Exhibit 558, microscopy investigation by Newfields entitled AOC Non-Native Residential Soil Excavation at 76 Union St:PPIN2010, bearing Bates No. USMR01074789(annotated), marked for identification, as of this date.)

CONTINUED BY MR. SUTHERLAND:

Q. Dr. Flowers, I'm showing you a document that I marked as Exhibit 558. And Exhibit 558 is a page that I just blew up from Exhibit 549, that is the microscopy investigation by Newfields.

A. Yes.

Q. And it is just one page that I made bigger so we can see it a little bit better. And Exhibit 558 is some photographs of some microscopy and an aerial photograph of one of the properties in the AOC, it's PPIN2010 at 76 Union Street.

Do you see that?

A. Yes.

Q. And I've inserted the Bates number here although, you know, this document has obviously been annotated since the original. What I wanted to direct your attention to was the soil profiles that you can see on the left side of the page, sort of the second column there.

A. Yes.

Q. And do you agree with me that those soil profiles show lenses of material that appear to be non-native?

A. Since I haven't really looked at the native soil, I can't say for sure.

Q. Well, at least with respect to the --

A. They look like they're layers there, I would say that.

Q. Yes. If we look at the bottom one, there's at least, you know, four, perhaps even five distinct layers there; correct?

A. There are different layers there for sure.

Q. And there's at least four of

them; right?

A. Yeah.

Q. And if we assume that black layer that I've got the red oval around is bottom ash or cinder, then that machine has the potential to contain elevated levels of arsenic; right?

A. Maybe.

Q. It's possible?

A. Yeah. It's possible. It depends where the ash came from.

Q. And if we look at -- well, let me ask a question about that.

You testified in your Pennsylvania coal ash case -- no, no, you testified in the Raritan Baykeeper case that coal from Appalachia tends to have higher levels of metals; correct?

A. Higher levels of metals?

Q. Yes.

A. It does have metals in it and it particularly reports to the boiler ash when it's burned, that's where the highest concentrations are, but some of it reports to the fly ash.

Q. And those metals would include arsenic; correct?

A. Yes.

Q. And they would include, to a lesser extent, but they would also include some lead?

A. Maybe, maybe not.

Q. And if we look in the third column, the bottom picture, do you see that layer that's visible that has the red circle around it?

A. Yes.

Q. And you notice that that layer, you would agree with me, it ends somewhere sort of in the middle of the page; correct? I mean the middle of the photograph.

A. I don't -- the one with a circle around it seems to be toward the bottom of the -- you mean the top part of it?

Q. Yeah. I'm just -- I'm just -- I'm referring to this photograph in the third column on the bottom.

A. Oh, I'm on a different photograph. That's what the problem is.

Q. Yeah. The third column, the

bottom photograph, it's got a little text box that's got an arrow on it and it says excavation under the driveway between the two houses. The black cinder layer ends at the property line.

Do you see that?

A. Yeah. I see what you're talking about.

Q. And so we have, at least between these two adjacent properties, we have distinctly different positions at least at this location as to the lithology of this soil column at least in this area; right?

MR. GERMAN: Objection. You can answer.

A. Well, I guess I would like to have been there and, you know, if you look at the diagram, it looks like the digging, there may be material on top of that layer to the right.

Q. Have you had an opportunity to be present for any of the excavations in Carteret?

A. No.

Q. Is that something that you had

wanted to do?

A. No. Not really. I haven't wanted to do it. I didn't find it necessary to be there.

Q. Did you know that the excavation at the named plaintiff, the Duartes, happened this week?

A. No, I didn't know that.

Q. Would you have wanted to be there if you could?

A. For my opinion, it wasn't necessary to be there on an individual property.

Q. It's not necessary to be there to make an assessment of whether or not non-native fill materials were present on these residential properties?

A. Well, I don't think from one property you can make the conclusion that it's on all properties, but, you know, again, my conclusion was that air deposition was the dominant mechanism, and I did say that fill could be present on some properties. May be contaminated, may not be contaminated, but the overall pattern is consistent with

air deposition.

Q. But you would agree with me that to answer the question of is there a fill on the property and is that fill if it's present contaminated, those are questions that you have to go and look at the specific property to answer; right?

MR. GERMAN: Objection.

A. I was not asked that question.

Q. But in order to answer those questions, those are questions if we want to know the answer for a particular property, we have to go and look at the property itself; right?

MR. GERMAN: Objection.

A. I was never asked to go to a specific property. I wasn't tasked that.

Q. Can you answer my question in terms of if you were asked that question and if you needed to answer that question, you would have to go to the property and investigate it to determine if there was fill present and if it was contaminated?

MR. GERMAN: Objection. Asked and answered. You can answer.

A. I -- again, if that was the task, say you called me up and said I want you to go specifically to this parcel and I want you to go and put down holes and tell me what you find, I would have to go put down holes and tell you what I found.

Q. And the answers to the questions that we've been talking about in terms of whether there's fill present on that property and whether that fill, if present, was contaminated, the answer to those questions as to that property don't tell you anything about what the answer to those same questions would be for the property next door, do they?

MR. GERMAN: Objection.

A. Not necessarily.

Q. They do or they don't?

A. They don't necessarily.

Q. They don't tell --

A. I don't know -- I don't have data -- I don't have, you know, information, I didn't look at that. I wasn't asked to do that, look at it on a parcel by parcel basis. I was asked to determine the dominant, you

know, transport mechanism for waste.

Q. If you could turn to Exhibit 547, the Geosyntec deposition -- document. And if you go almost to the back, go to Bates USMR01074746.

Are you there?

A. I'm trying to get there.

Okay.

Q. And in this initial page, 746, it describes terms that were used in the lithology descriptions.

Do you understand that?

A. Yes.

Q. And these terms were chosen as being indicative of non-native fill materials.

Do you understand that?

MR. GERMAN: Objection.

A. Yes.

Q. And then what Geosyntec did is that they then searched for the individual soil intervals and identified those that included these lithology terms that are associated with non-native material.

Do you see that?

A. Yes.

Q. And the results of that exercise indicated that depending upon the soil interval in the first four intervals, 31 to 39% of the samples had some sort of indication of non-native fill material.

Do you see that?

A. That's what it says; yeah.

Q. And did you -- I think you already told me, you didn't look at the boring logs in connection with your conclusion that there's no evidence of extensive non-native fill materials; correct?

MR. GERMAN: Objection to the form of the question. You can answer.

A. Again, it depends on what you call the definition of extensive. They have 53,960 samples in the AOC. That's way more than the number of analyses that are in the AOC. So I don't know how that number relates to the number of samples taken.

Q. But at least, according to this table, for that top two feet, approximately a third of the top two feet, approximately a third of the samples have fill in them; right?

A. According to this, yeah.

Q. You had access to the boring logs, didn't you?

A. We've gone over this. Yes, I -- no, I didn't. I never got the boring logs and I didn't need the boring logs.

Q. So you didn't ask for them?

A. No.

Q. One of the properties that you identified by -- specifically was PPIN 7337 and I'm looking at page 18 of your report.

A. Right.

Q. And this was one of the transect samples that had particularly high copper, arsenic and lead concentrations; correct?

A. Right.

Q. But you didn't do any property specific evaluation as to why those concentrations were high; right?

A. No, I didn't.

Q. Did you ask if anybody else had done an analysis of that type?

A. No. My point in mentioning that was to show that there was anomalous copper, arsenic and lead removed from the smelter site, and that was consistent with what I

had seen looking at all the data.

Q. Is it your opinion that the copper, arsenic and lead that you report there on page 18 more likely than not came from the smelter?

A. Yes.

Q. All right. Let me have you go back to Exhibit 547. And turn to Bates USMR01074725.

Are you there?

A. Yes.

Q. And this initial page shows a picture of the structure and cross-references the address, 180 Pershing to the PPIN 7337.

Do you see that?

A. Yes.

Q. And that matches up with the sample ID that you have for sample 7337 on page 18 of your report; correct?

A. Right.

Q. And if you flip the page to the next page Bates USMR01074726, you will see a Sandborn map of that same property from 1912.

Do you see that?

A. Yes.
Q. And backed up against that property is a property that was used -- that's -- it's a Roosevelt Printing Shop.
Do you see that?
A. Yes.
Q. And there's a shed that's immediately adjacent to the back property line --
A. Right.
Q. -- of 7337; right?
A. (Witness nods head.)
Q. Is that correct?
A. Yes.
Q. And it's correct to say that copper is a common component of printing ink; right?
MR. GERMAN: Objection. You can answer.
A. It's a component of printing ink; yes.
Q. The cayenne that we talk about, that's a copper cayenne compound that --
A. Right.
Q. -- gives that color its name;

right?

A. Right.

Q. And it's at least plausible that while that property was being used as a printing shop, that shed was used to store printing ink; correct?

MR. GERMAN: Objection.

A. It's plausible.

Q. And it's plausible that that shed could have been used to store used solvents that were used to clean the printing presses from the printing sledges; correct?

MR. GERMAN: Objection.

A. It's possible.

Q. If we go to the next page of Exhibit 547, that's USMR01074727, in the late 1960s, that property tied into an auto shop; right?

A. Yes.

Q. And copper is a common compound for brake pads; right?

MR. GERMAN: Objection.

A. Yes.

(Exhibit 559, copy of boring

logs for PPIN 7337, marked for
identification, as of this date.)

Q. I'm handing you a document that I've marked Exhibit 559. Exhibit 559 is a copy of the boring logs for the property we've been talking about, PPIN 7337 at 180 Pershing Avenue.

Do you understand that?

A. Yes.

Q. And if you look at the boring log information for the various borings that were done, many of them mention the presence of cinders and coal within the boring; correct?

A. Yes, they do.

Q. And cinders and coal would not naturally be present in the soils of Carteret, would they?

MR. GERMAN: Objection.

A. No, they wouldn't.

(Exhibit 560, location map for
where borings were taken on PPIN 7337,
marked for identification, as of this
date.)

Q. I'm handing you a document that

I've marked as Exhibit 560. Exhibit 560 is a location map for where the borings were taken on PPIN 7337.

Do you see that?

A. Yes.

Q. And let me go ahead and do this, too.

(Exhibi5 561, copy of analytical results for PPIN 7337, marked for identification, as of this date.)

Q. I will hand you a map, a table that I've marked as Exhibit 561, and Exhibit 561 is a copy of the analytical results for PPIN 7337.

Do you see that?

A. Yes.

Q. And if we look at the highest copper and lead and arsenic concentrations, those are in sample numbers 1, 2 and 3; right?

MR. GERMAN: Objection.

A. No. I mean, are you --

Q. Well, okay, and then 9. 1, 2, 3 and 9.

MR. GERMAN: Objection.

A. I mean, are you throwing out the

X? That's the highest copper.

Q. Okay. All right. Well, okay.

So the highest copper, we got -- I did say 3; right? So the highest copper is in boring 3; right? Because that's 6,550?

A. Maybe I'm -- yeah, yeah, that's the highest copper.

Q. And then the second highest copper is in boring 2; right? 1,710; right?

A. Yes.

Q. And if we look at our sample map, that's borings 2 and 3, those are the two borings that are closest to the shed that was used by the printing press; right?

MR. GERMAN: Objection.

A. When you compare the maps, that's true.

Q. Is it at least within the realm of possibility that some of the copper that was measured in borings 2 and 3 came from spillage from copper inks and copper cleaning materials from that printing press operation?

MR. GERMAN: Objection.

A. It's within the realm of possibility, yeah. Can it be proved? No.

Q. Within -- if we look at boring number 8 on Exhibit 561?

A. So when you say boring, what identifier are you using?

Q. Oh, I'm sorry. I should have helped you with that. If you look at the sample ID number --

A. Yes.

Q. -- and then next to the sample ID number it says use area.

A. Use area.

Q. The use area, the last, that's the --

A. That's the boring?

Q. That's the boring number.

A. Okay.

Q. And then just to make it all clear, those boring numbers then correspond to the numbers on the map on page 560.

A. Okay. I get that. I just didn't know where you were getting the boring number --

Q. Yeah.

A. -- because there was no label.

Q. And the boring number is

actually repeated in the sample ID number, it's the third field over.

A. Yes. I get it.

Q. I'm sorry. I should have done that.

So if we look at boring number 8 on Exhibit 561, all of those values, both for the zero to 6 and the 6 to 12 inch intervals are low; right?

MR. GERMAN: Objection.

A. Lower; yeah.

Q. I mean, the lead values are even lower than the 200 ppm that you've mentioned based upon the Matteo Record of Decision?

A. Yes, they are.

Q. And the arsenic numbers are below the cleanup level of 19?

A. That's true. The copper, that 68 is a little high.

Q. So you would agree with me that at least between boring number 8 and borings 1, 2 and 3 that we talked about previously, there's a wide disparity in the concentrations on this one property; right?

MR. GERMAN: Objection.

A. There's variation on this property and that's seen throughout the data set.

Q. And is it your opinion to a reasonable degree of scientific certainty that the variability that we see on PPIN 7337 in concentrations is consistent with the conceptual site model based upon air deposition?

MR. GERMAN: Objection. You can answer.

A. The -- that's a hard question to answer. There's variability with depth and you don't know -- if you look at a log, it's hard to say at this degree of granularity what part is air deposition, but it was in close proximity to a smelter that was raining material out of it, so I would say that some of this represents smelter material.

Q. How much of it is smelter material?

A. I don't know.

Q. I think I understood you to say that you did not do any individual property analysis as part of the preparation of your

opinions in this case; correct?

A. That's correct.

Q. And that includes any individual property analysis of the named plaintiff's property, that is the Duartes; correct?

A. That is correct.

Q. In your mind, would a visible fill layer of combustion materials that's two feet thick, would that be typical of a residential property in this class?

MR. GERMAN: Objection.

A. I don't know if it's typical.

Q. Would visible remnants of a prior building foundation and would construction debris below the soil, would that be typical of what you would expect to find in Carteret?

A. I don't know --

MR. GERMAN: Objection.

A. -- what typical means.

Q. And you don't have an opinion about what's typical; correct?

MR. GERMAN: Objection.

A. I don't know what typical means.

Q. Okay.

A. See, I think you have to take

into consideration that while all this stuff is going on in Carteret, filling, tearing down buildings, doing whatever they're doing, meanwhile the smelter is raining down continuously contaminated material that gets mixed in with all of this (indicating), and so as long as the smelter is working, the smelter is contributing.

MR. SUTHERLAND: Objection. non responsive to everything after I don't know what typical means.

Q. Dr. Flowers, did you have any involvement in the sampling that was done by the plaintiffs?

A. We've covered this and I said that I did not go in the field.

Q. Did you talk to the contractor who did the sampling?

A. No; except after the fact.

Q. And what discussions did you have with him after the fact?

A. I asked him to provide me with location diagrams for where the samples were taken and coordinates for the sample locations.

Q. And did he provide you with a

copy of his field notes?

A. He provided me with drawings showing the location of the building and where the samples were taken and their coordinates.

(Exhibit 562, document bearing Bates Nos. Rosenfeld 000331-341, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as Exhibit 562.

Is that a copy of the document that he provided to you?

A. One of them. This is the first one, the first tranche.

Q. And if you just flip through it, is it -- there's a couple more after it.

A. Oh, well, then if you've got them all, then you're -- this is the type -- yeah, this is the information I was provided with.

Q. Okay.

Do you recall who it was that you talked to?

A. No, I don't, which is not atypical for me.

Q. I just -- I want to ask you just a couple of questions about these field notes.

Did you notice looking at, for example, look at Bates Rosenfeld 0000337, it's a hand -- one of the handwritten ones about a little more than halfway back.

A. Okay.

Q. And the top property is 99 Randolph.

Do you see that?

A. Yes.

Q. And the plaintiff's contractor noted that this particular set of samples, there were coal fragments present between zero and 1 foot; correct?

A. Yes.

Q. And then the sample below that, the plaintiff's contractor indicated that there was fill to 1 foot; correct?

A. Right.

Q. And then the third sample, there is no fill, and then the fourth sample, there was fill from zero to 1 feet coal frag; correct?

A. Yes.

Q. Did you have any discussion with the contractor for the plaintiff's sampling about whether or not they saw evidence of fill on a somewhat frequent basis?

MR. GERMAN: Objection.

A. No, I didn't.

Q. Have you physically looked at any of the samples?

A. No.

Q. You said that you'd been to Carteret before. When did you go to Carteret?

A. I visited Carteret in April.

Q. What was the purpose of your visit?

A. I was asked by Mr. German to connect up the on site geography with what I'd been looking at maps so I understood where the smelter was, where the houses were.

Q. So the primary purpose of your visit was to get oriented in terms of the location of the smelter versus the location --

A. Yes.

Q. -- of the whole class area?

A. Yes, I would say that's correct.

Q. You have to let me finish. I

know I'm slow sometimes, but --

A. Yeah. Well, that's what it was for, is to put together, you know, when I look at a map, I don't know what the place looks like, so the idea was to go visit and see what Carteret looked like.

(Exhibit 563, letter report by Susan Litherland dated June 21, 2018, bearing Bates Nos. USMR00855064-104, marked for identification, as of this date.)

Q. I'm handing you a document that I've marked as 563.

Have you ever seen Exhibit 563 before?

A. No.

Q. Exhibit 563 is a letter report of a property inspection that was done by defendant's consultant, Susan Litherland.

Do you understand that?

A. That's what it says.

Q. And there was actually an environmental consultant there for the plaintiffs.

Did you ever see a report from a

plaintiff's expert related to this inspection that took place in summer of last year?

A. No.

Q. Let me have you turn to -- let's see -- let me have you turn to Bates USMR00855074, and you can see there in photo 9 the various sample locations that the consultant sampled.

Do you see that?

A. Yes.

Q. And so, for example, there was a sample of the dirt right below a deck and then they actually took a sample of the wood of the deck.

A. Okay.

Q. Do you see that?

And then if you, for example, flip over to Bates USMR008558080, you'll see some samples that were taken of -- in photo 5 there's a dock where we took a wood sample of a garden, you know, timber, you know, timber that people use to make flower beds and the like.

Do you see that?

A. Right.

Q. And then we took a sample of the fence and you can see in photo 8.
Do you see that?
A. Yes.
Q. And if we go back in the report to the analytical report, and I'm looking at page 855070, there's a table of the analytical results.
A. 855070?
Q. Yeah. It looks like this.
A. Okay.
Q. And the various wood samples, one of the wood samples, and you can see this by the sample type, wood sample had 3,240 parts per million arsenic and 2,040 parts per million of copper; correct?
A. Yes.
Q. And then another wood sample had 1,960 parts per million arsenic and 626 parts per million copper; right?
A. Right.
Q. And then the deck post that we looked at, that obviously was made after copper chromium arsenic treated wood was no longer sold for residential purposes because

the arsenic is low, but the copper is still high, 4,840; right?

A. Yes.

Q. And then some lattice that was sampled that was treated still had the high arsenic at 1,040; right?

A. Right.

Q. And you would agree with me that, as you say, everything breaks down; right?

A. Sure.

Q. And so some portion of this arsenic and copper from these construction materials as they break down in age, it's going to end up in the soil; right?

MR. GERMAN: Objection.

A. Sure, it's possible it could end up in the soil. It could be diluted out by the soil, too, to some degree.

Q. Right, but, I mean, just -- I mean, mass doesn't disappear.

A. No, it doesn't disappear, but concentration varies depending on dilution factor.

Q. Right. Right.

MR. SUTHERLAND: I need to take a break and organize my materials to see what else I have left.

THE VIDEOGRAPHER: Okay. We are going to go off record 3:01.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: Back on the record at 3:11.

CONTINUED BY MR. SUTHERLAND:

Q. Dr. Flowers, I just have a few more questions.

If you could turn back to your report, Exhibit 543, and under Summary of Opinions in the first numbered paragraph, you list a number of things that are lines of evidence that you contend support your conclusion that the class area was contaminated with copper, arsenic and lead from the USMR smelter.

Do you see that?

A. Yes.

Q. And I think we've talked about most of these, but I want to make certain. The first one is history of air pollution

violations.

Do you see that?

A. Yes.

Q. And you didn't make any effort to quantify the emissions from those air violations, did you?

A. No. I just made a note there were a lot of violations for ambient lead in the atmosphere.

Q. You noticed that there were violations for ambient lead?

A. For ambient lead. That means lead was getting into the atmosphere in sufficient concentrations where you could measure it in the air.

Q. Well, I thought you told me this morning that you did not review the ambient air monitoring data for lead concentrations?

A. I did not. I just made note of the fact that there were violations.

Q. And it's your understanding that there were actual violations of the Lead National Ambien Air Quality Standards?

A. There were citations --

Q. And they were --

A. -- in some of the literature I read.

Q. And it's your recollection that those citations included citations for violations of the Ambient Air Quality Standards for lead?

A. I don't see how you get a citation without a violation.

Q. Well, you know, I don't know that you can either. I'm just trying to make certain as you sit here right now your recollection of the violations that you're referencing are actually violations --

A. Right.

Q. -- of the National Ambient Air Quality Standards.

A. I think they are.

Q. Okay.

A. I think they are.

Q. Okay.

And you did not do any kind of quantification of how much lead those violations may have contributed to particular properties in the class; right?

A. No, I didn't.

Q. And then the fourth line of evidence you have listed there is historical aerial photographs showing plant emissions blowing over Carteret.
Do you see that?
A. Yes.
Q. And sort of the same question, you didn't do any quantitative type of analysis of what the lead or particulate impacts of those, what was depicted in those photographs might be on the proposed class area, did you?
A. No, I didn't.
Q. And then I will have you turn to exhibit or Figure 27 of your report.
A. Okay.
Q. And Figure 27 is a figure that was created by Mr. Sullivan; correct?
A. Yes.
Q. And I think you testified that you were relying on Sullivan's air modeling really from a qualitative standpoint of here's what we would expect in terms of the general distribution of airborne contaminants; right?

A. Right. And I think that's the main utility of air models.

Q. And if we look at modeling data that Mr. Sullivan has reported, he shows a number of I think they're referred to as isopleths; right?

A. Yes.

Q. And those are those black lines, and those indicate, according to Mr. Sullivan's report, the contribution of lead to the soil from the USMR facility; right?

A. From air deposition; yes.

Q. And if I understand your testimony correctly, you're not really putting a lot of stock in the actual numbers themselves, but you are relying on sort of the general shape of what those lines look like?

A. Yes. Because to get a concentration, he has to make a number of assumptions like what is the volume of soil the lead goes into, what's the density, etc., and so -- and he only considers the upper six inches, for example, and it's clear that at least from the plaintiff's

sampling, the upper foot is impacted, we don't know if it goes deeper than a foot, but out on the periphery we do have exceedances within the top foot.

Q. So if I understand the modeling correctly, the model at least predicts that along each one of those black lines, the air deposition impact ought to be at least roughly equivalent; correct?

MR. GERMAN: Objection. You can answer.

A. Yes. Again, with the restriction that there are assumptions built in to drawing those lines. The better way to say it would be that according to the model, the dry deposition from the smelter is constant along those lines and he converts that to an equivalent concentration in the soil under a set of assumptions.

Q. So if we look at, and I'm particularly focused on the area between the 250 ppm line and the 200 ppm line. Do you see that?

A. Yes.

Q. So if we look at the area

between those lines, the model would tell us that the impact should be roughly equivalent between those two lines; right?

A. It would be somewhere between 250 and 300.

Q. But if we look at Sullivan's figure, he's posted the zero to six inch soil lead concentrations for the properties that were sampled between those two lines.

Do you see that?

A. Barely.

Q. And if you look at the far east transect, there are a number of properties with post plots that are orange and red; correct? And those indicate lead concentrations of over 600 parts per million; correct?

A. Right.

Q. And then if we look along that same interval and we go over to the far west transect, all of the samples there are either green or blue which indicates that all concentrations are below 400 ppm.

Do you see that?

A. Yes, I see that.

Q. And have you done any evaluation that explains why when the model predicts equivalent concentrations, the actual data shows a marked difference?

A. No; but my point was that the model is qualitative, it's based on a set of assumptions that are probably not easily verifiable, and so the predictions in terms of parts per million I take with a grain of salt.

Q. Well, I'm not really asking you about predictions in terms of parts per million, what I'm really asking you is predictions with respect to equivalents, because these isopleths suggest that there would be an equivalent impact between these two sets of properties; isn't that right?

MR. GERMAN: Objection.

A. That's what it predicts based on deposition, not anything that might have happened after deposition and this is an integrated picture of a full scenario.

Q. And you would at least agree with me that the post plot of the soil data suggests that those impacts between the

western transect and eastern transect are not equivalent, are they?

A. Oh, that's what the graph shows; yes. I would agree with that.

Q. Okay.

MR. SUTHERLAND: Pass the witness.

MR. GERMAN: I need like five minutes just to look through my notes.

MR. SUTHERLAND: Okay.

THE VIDEOGRAPHER: All right. We'll go off the record at 3:20.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: Back on the record 3:34.

EXAMINATION BY

MR. GERMAN:

Q. Dr. Flowers, I just want to ask you hopefully a few questions to clarify some issues that I had with your testimony today, make sure I understand it, and I want to begin with the series of questions we just left off with concerning the Dr. Sullivan's air model, which is exhibit -- which is Figure 27 in your report, which is Exhibit 543.

Do you have that?

A. Yes.

Q. And Mr. Sutherland asked you some questions about what this model is predicting.

Do you know those questions?

A. Yes.

Q. And one of the last questions he asked you is whether this model predicts that properties in the northeast along the iso-concentration lines would receive smelter impacts that are different, for instance, from properties in the far west.

Do you remember a question like that?

A. Yes.

MR. SUTHERLAND: Object to the form.

Q. And I think your testimony was, according to what's predicted here, which you take with a grain of salt, this model would predict that the impacts in the northeast, for instance, would be different from -- would be numerically different to some extent from impacts in the west.

Is that what you said in your testimony or --

MR. SUTHERLAND: Object to --

Q. -- did I misunderstand that?

MR. SUTHERLAND: Objection to form.

A. That's what I see in the diagram.

Q. Okay. I have a slightly different question.

Does this model, Figure 27 from Dr. Sullivan, tell you anything in a broader sense about impacts from the smelter in the proposed class area?

A. The fact that the isopleths extend outward to the New Jersey Turnpike tells me that the entire class area was impacted by smelter operations.

Q. And that's true despite some variations in these contour lines; is that accurate?

A. Yes.

Q. Okay.

Now, this area of impact from the smelter, is that what you depicted in Figure 28?

A. In Figure 28, this is a figure showing the proposed class area is considered with the area impacted, and in my opinion the impact probably goes beyond the proposed class area, but it does impact the entire class area.

Q. Okay.

And would it be accurate to say that all of the properties in this proposed class area on Figure 28 share the common trait that they've been impacted by that source, the USMR smelter?

A. Yes.

MR. SUTHERLAND: Object to the form.

Q. And would a property in the northeast of the proposed class area be similarly situated as a property in the southwest vis-à-vis its impacts from the smelter?

MR. SUTHERLAND: Object to the form.

A. It would be impacted regardless of where it is in the class area.

Q. And when you say impacted, are

those significant impacts? How would you describe those impacts?

MR. SUTHERLAND: Object to the form.

A. Yes, I would -- I would describe them as significant impacts from air deposition.

Q. From the smelter?

A. From the smelter.

Q. Now, I want to turn your attention to Exhibit 561.

A. Is that my report?

Q. No. It's this table, this Excel file.

A. Okay.

Q. Concerning PPIN 7337.

A. Okay.

Q. And --

A. Is this it?

Q. Yes.

A. Okay.

Q. 561?

A. Yeah.

Q. And Mr. Sutherland asked you a series of questions about this.

Do you recall some of those questions?

A. Yes.

Q. And one of the questions or a series of the questions related to sampling boring number 08.

Do you remember that?

A. Yes.

Q. And I'm going to paraphrase this testimony and you can correct me if I misunderstood it or I'm sure he will object, but I recall you being asked something along the lines of as you look at boring 8, can you tell us how much of what we're seeing in the boring 8 sampling results came from the smelter.

Do you remember that question?

A. Yes, I do.

Q. Okay.

And do you remember what your answer was?

MR. SUTHERLAND: We're talking about boring 8?

MR. GERMAN: Boring 8.

Q. I think you asked -- your answer

was I can't tell for boring 8 how much of this came from the smelter. Do you remember saying that?

A. Not quantitatively.

Q. Okay.

A. But it has the signature of the smelter in the sense that arsenic, copper and lead show the sympathetic relationship that I cite in my report. Even the low values like the sample with 68.6, that's an elevated copper, it has an elevated lead and not so much an elevated arsenic. The only sample in there that is really atypical is the lowest one, which has the low copper.

Q. And if I asked you to look at the bigger data set of 7337, all of the sampling results --

A. Okay.

Q. -- could you then tell us how much of that comes from the smelter?

A. I could tell you whether the majority of it came from the smelter or not. One of the things I would do is I'd take all the data and I'd run the Spearman coefficient on all of the data from this boring and I'd

see how big it was.

Q. And sitting here now, as you look at this data and having done what you've done in this case, can you tell us how much comes from the smelter?

A. The majority. Mainly because of the elevated copper throughout the core.

Q. Throughout the day today you were shown certain exhibits, including, for instance, 547, which is the Geosyntec PowerPoint, which contains some chemical fingerprint analyses and variograms, you were shown the Newfields forensic microscopy investigation, which is 549, and you were shown Exhibit 548, which is the FTI overview of alternate sources of copper, lead and arsenic.

Do you remember discussions surrounding those three documents?

A. Yes.

Q. And we spoke about Paris Green and we spoke about leaded paint and we spoke about all sorts of other potential sources of contamination or theoretical or hypothetical sources of contamination in Carteret.

A. Yes.

Q. Did you -- having seen all this today, are you comfortable that you've seen the information you need to see to render the opinions you've been asked to render to date?

A. Well, I rendered the opinions before I saw any of that, and as a result I must be confident in my opinions, so I don't think I needed that material to render the opinions I rendered.

Q. And do you feel that you've conducted all of the analysis you need to conduct to render the opinions you've rendered to date?

A. Yes.

MR. GERMAN: I have no other questions.

MR. SUTHERLAND: Just a few follow-ups.

CONTINUED EXAMINATION

BY MR. SUTHERLAND:

Q. Dr. Flowers, you were asked a number of questions sort of what you said in response to my questions about Figure 27 of

your report and then what you said in response to my questions with respect to Exhibit 561. None of the answers that you gave me, you know, 30 minutes to an hour ago, you don't feel the need to amend any of those answers, do you?

A. To your questions?

Q. Yes.

A. I don't think that -- so your questions were very focused on specific details here. The only amendment I would offer is that there is a significant impact, the chemical data here is consistent with significant impact from the smelter.

Q. Okay.

A. Regardless of whatever else is in there.

Q. Right.

But in getting into the details that we discussed with the individual borings and the like, you don't feel a need to amend any of those answers, do you?

A. I would -- not really. I don't think they bear on my report. They weren't required for my conclusions and they don't --

I don't believe they affect my conclusions.

Q. Okay. Fair enough.

And the same thing is true with respect to the discussion that we had about Figure 27 and how to interpret the various isopleths versus the post plot data for the soil samples on Figure 27 of your report, you don't need to amend any of your answers, do you?

A. You asked me what I saw in the picture and what's in the picture is in the picture.

Q. Okay. Fair enough.

On Figure 28, that's the proposed class area; correct?

A. Yes.

Q. Did you have any involvement in setting the geographic boundaries of the proposed class area?

MR. GERMAN: Object to form.

You can answer.

A. No.

Q. And when you received the assignment that you did in this case, you were given that proposed class area as part

of your assignment; right?

A. Yes, I was --

MR. GERMAN: Objection to form.

A. -- given the Complaint and the class area was in the Complaint.

Q. There were a few questions that Mr. German asked you about where you used the word impacts.

Do you recall that?

A. Yes.

Q. And in the context of those answers where you used that term impacts, you were not attempting and you have not indeed done any kind of quantitative analysis of the impact of the historical air emissions from the smelter on particular properties within the class; right?

A. Not on particular properties. Just the class area as a whole.

Q. And even with respect to the class area as a whole, when you described there being significant impacts across the class, have you done any sort of putting a number to that for the class area?

MR. GERMAN: Objection to form.

A. I would say that the majority of the elevations that we see in the soil are due to the smelter.

Q. But in terms of the actual, hey, it was --

A. 12% or --

Q. 12% --

A. -- 13?

Q. -- or 30%.

A. No, I haven't done that.

MR. SUTHERLAND: Pass the witness.

MR. GERMAN: One last question.

CONTINUED EXAMINATION

BY MR. GERMAN:

Q. Dr. Flowers, if you were to define the class area, if you were asked to define the class area, based on an area with significant impacts from the smelter, would it extend beyond the boundaries in Figure 28?

A. Yes, I would expect that it would.

MR. GERMAN: No other questions.

MR. SUTHERLAND: We're done.

MR. GERMAN: All right. That will conclude this deposition at 3:48

and end media 5.

THE REPORTER: Can you please just tell me if you want the witness to read and sign or if you waive?

MR. GERMAN: Read and sign.

THE WITNESS: I would like to read and sign.

A C K N O W L E D G E M E N T

I, GEORGE C. FLOWERS, Ph.D., hereby certify that I have read the transcript of my testimony taken under oath in my deposition of June 14, 2019; that the transcript is a true, complete and correct record of what was asked, answered and said during this deposition, and that the answers on the record as given by me are true and correct.

____

GEORGE C. FLOWERS, Ph.D.

Subscribed and sworn to

before me this ____ day

of______________, 2019.

____

NOTARY PUBLIC

C E R T I F I C A T E

STATE OF NEW YORK)
) ass.:
COUNTY OF NASSAU)

I, ROBIN LaFEMINA, a Registered Professional Reporter, Certified LiveNote Reporter and Notary Public within and for the State of New York, do hereby certify:

That GEORGE C. FLOWERS, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me and that such deposition is a true record of the testimony given by such witness.

I further certify that I am not related to any of the parties to this action by blood or marriage; and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 20th day of June, 2019.

ROBIN LaFEMINA